



***Four Lakes
Aquatic Vegetation Management Plan
2006 Update
February 19, 2007***

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Executive Summary

Aquatic Control was contracted by the Four Lake Property Owners Association to complete aquatic vegetation sampling in order to update a lakewide, long-term integrated aquatic vegetation management plan. The study area includes the four lakes, Cook, Holem, Kreighbaum, and Millpond. These lakes are located south of Plymouth in Marshall County, Indiana. The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for LARE funds. Items covered include the 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans.

Aquatic vegetation is an important component of Indiana Lakes. Aquatic vegetation provides fish habitat, food for wildlife, prevents erosion, and can improve overall water quality. However, as a result of many factors, this vegetation can develop to a nuisance level. Nuisance aquatic vegetation, as used in this paper, describes plant growth that negatively impacts the present uses of the lake including fishing, boating, swimming, aesthetic, and lakefront property values. The primary nuisance species within the Four Lakes are the exotic plants Eurasian watermilfoil (*Myriophyllum spicatum*) and purple loosestrife (*Lythrum salicaria*). Dense beds of coontail (*Ceratophyllum demersum*), white water lily (*Nymphaea tuberosa*) and spatterdock (*Nuphar advena*) are also abundant in the Four Lakes. These species are important components of a healthy ecosystem, but if left unchecked they can reach nuisance levels. Small populations of the nuisance exotic species common reed (*Phragmites australis*) and reed canary grass (*Phalarus arundinacea*) have also been documented in Holem Lake.

The primary recommendation for plant control within the Four Lakes chain involves the use of triclopyr herbicide to selectively control Eurasian watermilfoil throughout the lakes. This type of treatment should preserve and enhance the population of native vegetation and relieve nuisance conditions created by Eurasian watermilfoil. Ideally, the objective is to eliminate this exotic species, but in a waterbody of this size, combined with inflow from other Eurasian watermilfoil infested lakes, this objective is likely not obtainable. A more realistic objective for this treatment is to maintain Eurasian watermilfoil below 5% frequency of occurrence in all four lakes and reduce relative density below 0.20. Currently, there is an abundant and diverse native population, and this should be at least maintained at current levels.

In 2006, fifty acres of Eurasian watermilfoil was treated on the Four Lakes. This treatment effectively controlled Eurasian watermilfoil to the point that it was not detected in the summer survey in Cook and Kreighbaum Lakes, was present at only a single site in Millpond Lake, and only two sites in Holem Lake. In addition a small area of common reed was also successfully treated on Holem Lake. It appears that the 2006 season was a step in the right direction for meeting the goals of the action plan. The diversity and overall health of the native plant community was maintained if not increased, Eurasian watermilfoil was drastically reduced, and reasonable access was provided through limited spot treatments of vegetation in high use areas. Due to the presence of Eurasian

watermilfoil in lakes above the Four Lakes and the presence of small amounts in Holem Lake, some milfoil will likely return next season and create nuisance conditions. The hard part is predicting how much will return. In all likelihood there will be less in 2007 than in 2006. We believe that no more than 47 acres will require treatment next season. It is possible that much less than this will require treatment, but it is better to be on the safe side. We recommend that the FLLA request funding for treatment of 47 acres of Eurasian watermilfoil in 2007 with Renovate herbicide. The cost of this treatment would be around \$20,000.

Common reed was treated this season with LARE funds. The treated area should be thoroughly inspected next season and any remaining plants should be treated. There was also a small area on the west end of Cook Lake that contained several common reed plants. This area should also be treated. These two areas should not total more than 1-acre. The cost of this treatment would be around \$1,000.

In order to adjust the plan and monitor the effects of the treatment it is important to complete plant sampling. This sampling should consist of a treatment map survey in the spring along with a Tier II survey in the summer. This data should be included in the 2007 update. The cost of the plant sampling and the update would be around \$4500.

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1.0 INTRODUCTION

This report was created in order to update the Four Lakes Aquatic Vegetation Management Plan. The study area includes the four lakes, Cook, Holem, Kreighbaum, and Millpond. These lakes are located south of Plymouth in Marshall County, Indiana. The plan update was funded by LARE and the Four Lakes Lake Association (FLLA). The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for LARE funds. Items covered include the 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan, following the reference section and prior to the appendix.

2.0 2006 PLANT SAMPLING

Two surveys were completed on the Four Lakes in order to document changes in the plant community and to determine the success or failure of control techniques. Surveys were completed for all four lakes on May 25 and August 15 & 16, 2006. All four lakes are very different and require separate permits, so the sampling on the lakes was completed and will be discussed for each individual lake. Below is a list of all common and scientific names of species sampled from the lakes in 2006.

Table 1. Scientific and common names of species collected from the Four Lakes in 2006.

Scientific Name	Common Name
<i>Brasenia schreberi</i>	watershield
<i>Cephalanthus occidentalis</i>	button bush
<i>Ceratophyllum demersum</i>	common coontail
<i>Chara spp.</i>	Chara
<i>Decodon verticillatus</i>	swamp loosestrife
<i>Elodea canadensis</i>	American elodea
<i>Lemna minor</i>	common duckweed
<i>Lemna triscula</i>	star duckweed
<i>Ludwigia peploides</i>	creeping waterprimrose
<i>Lythrum salicaria</i>	purple loosetrife
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil
<i>Najas guadalupensis</i>	southern naiad
<i>Najas variegetum</i>	spatterdock
<i>Nymphaea tuberosa</i>	white water lily
<i>Peltandra virginica</i>	arrow arum
<i>Phragmites australis</i>	common reed
<i>Polygonum hydropiper</i>	water smartweed
<i>Pontederia cordata</i>	pickerel weed
<i>Potamogeton amplifolius</i>	largeleaf pondweed
<i>Potamogeton crispus</i>	curlyleaf pondweed
<i>Potamogeton gramineus</i>	variable pondweed
<i>Potamogeton illinoensis</i>	Illinois pondweed
<i>Potamogeton natans</i>	floating leaf pondweed
<i>Potamogeton pectinatus</i>	sago pondweed
<i>Potamogeton pusillus</i>	small pondweed
<i>Potamogeton zosteriformis</i>	flatstem pondweed
<i>Sagittaria spp.</i>	arrowhead
<i>Typha latifolia</i>	common cattail
<i>Utricularia vulgaris</i>	common bladderwort
<i>Wolffia columbiana</i>	watermeal

2.1 Millpond Lake Sampling Results

2.1.1 May Survey, Millpond Lake

On May 25, 2006 a Tier I survey was completed on Millpond Lake. The primary purpose of this survey was to create a Eurasian watermilfoil treatment map. In addition, this survey served as a tool to track changes in the vegetation community. A Secchi disk reading was taken prior to sampling and was found to be 4.5 feet. Plants were present to a maximum depth of 13 feet. The total littoral zone size was estimated to be 99.9 acres. Seventeen different species were observed in five different plant beds. Plant bed 1 was the largest plant bed and was composed primarily of rooted floating vegetation (Table 2 & Figure 1). Plant beds 2 and 4 were composed of dense stands of topped out Eurasian watermilfoil. The dense milfoil beds encompassed an area of 24.9 acres. Curlyleaf pondweed was the only other invasive exotic species observed. It was present in all of the plant beds but at relatively low densities.

Table 2. Millpond Lake, Tier I Survey Results, May 25, 2006.

Lake: Millpond		Number of plant beds: 5				
Date: 5/25/06		Number of species: 17				
Secchi:4.5		Littoral zone size: 99.9				
Littoral zone max depth: 13						
Plant Bed I.D.		1	2	3	4	5
Plant Bed Size (acres)		47.9	0.2	10.0	24.7	17.1
white water lily		2	-	1	-	-
spatterdock		4	-	1	-	-
arrowhead		1	-	-	-	-
purple loosestrife		3	-	-	-	-
pickeral weed		1	-	-	-	-
common duckweed		1	-	1	1	-
Eurasian watermilfoil		1	4	1	4	2
curlyleaf pondweed		1	1	1	2	1
flatstem pondweed		1	1	2	1	1
common coontail		1	2	3	2	4
smartweed		1	-	-	-	-
watermeal		1	-	-	-	-
common cattail		1	-	-	-	-
button bush		1	-	-	-	-
common bladderwort		1	-	-	1	-
largeleaf pondweed		-	-	1	2	1
small pondweed		-	-	1	-	-

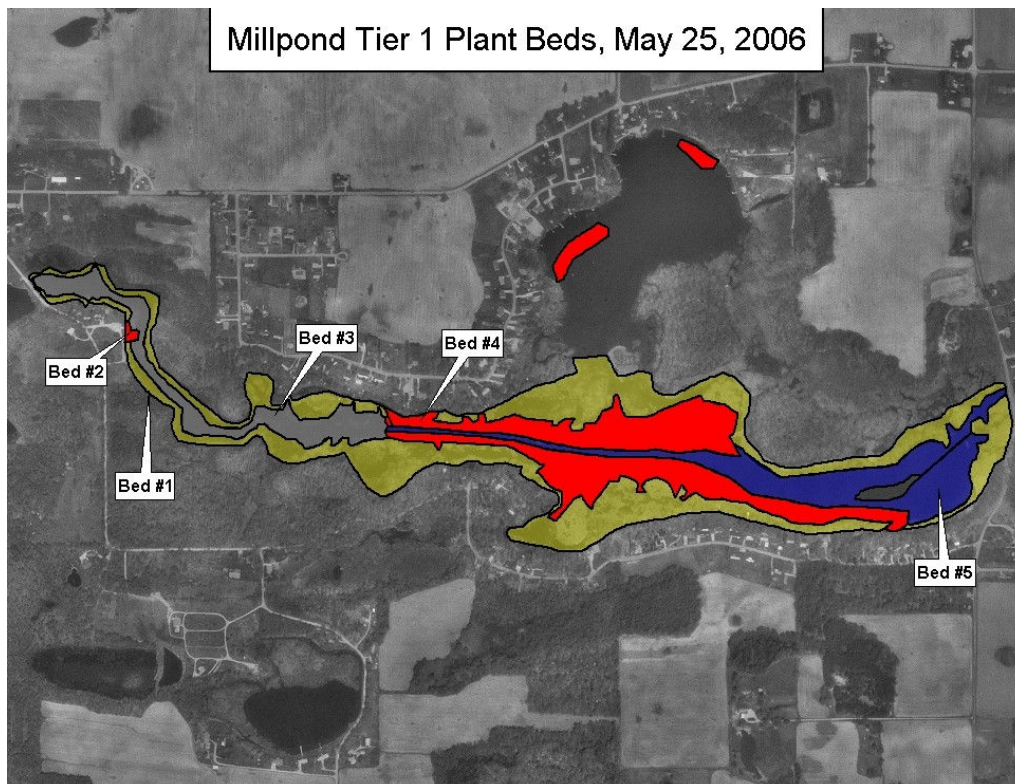


Figure 1. Millpond Lake, Tier I plant bed, May 25, 2006.

2.1.2 August Survey-Millpond Lake

A second survey was completed on Millpond Lake on August 15, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 8.0 feet. The Tier I survey revealed four different plant beds comprised of fifteen different species (Table 3 & Figure 2). Plants were growing to a maximum depth of 14 feet. The littoral zone area was estimated to be 98.6 acres. Plant bed 1 was the largest plant bed. This bed was made up of rooted floating and emergent vegetation. Purple loosestrife was the only invasive exotic species observed and received an abundance rating of 4 in plant bed 1. Eurasian watermilfoil and curlyleaf pondweed were not observed. Common coontail was the most abundant submersed species.

Table 3. Millpond Lake, Tier I Survey Results, August 15, 2006.

Lake: Millpond		Number of plant beds: 4			
Date: 8/15/06		Number of species: 15			
Secchi: 8.0		Littoral zone size: 98.6			
Littoral zone max depth: 14					
Plant Bed I.D.		1	2	3	4
Plant Bed Size (acres)		49.1	14.5	31.1	3.9
spatterdock		3	-	1	-
pickeral weed		1	-	-	-
arrow arum		1	-	-	-
white water lily		3	-	1	-
filamentous algae		2	-	-	-
common coontail		4	3	3	4
purple loosestrife		4	-	-	-
common cattail		1	-	-	-
duckweed		2	1	-	-
common bladderwort		1	1	1	-
Illinois pondweed		1	-	1	-
largeleaf pondweed		1	-	2	-
swamp loosestrife		4	-	-	-
arrowhead		1	-	-	-
watermeal spp.		1	-	-	-

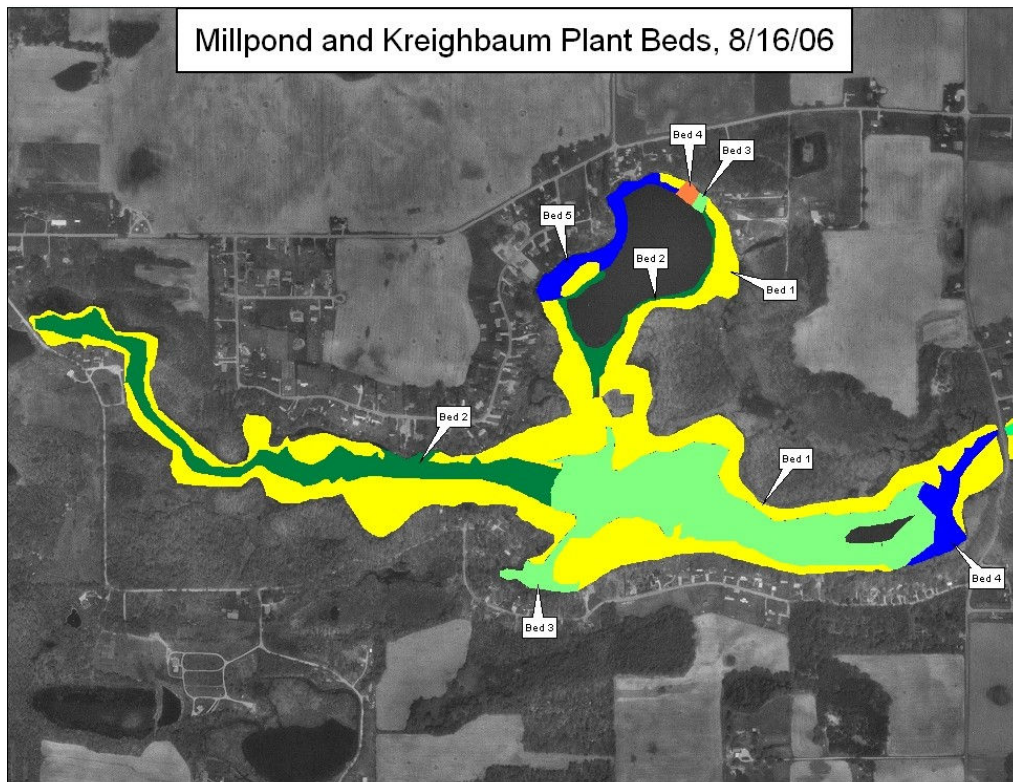


Figure 2. Millpond Lake, Tier I plant beds, August 15, 2006.

On August 15, 2006 a Tier II survey was completed on Millpond Lake following the Tier I survey. A total of 50 sites were sampled throughout the littoral zone (23 sites from 0-5ft, 17 sites 5-10ft, 10 sites 10-15 ft, and 10 sites 15-20ft). These same sites should be sampled again next season and floating species should not be included in next season's results. Results of the sampling are listed in Table 4. Overall aquatic vegetation distribution and density is illustrated in Figure 3 (in the "density and distribution figures" sample sites without plants are illustrated with small white diamonds and sites with plants are illustrated with different color and size circles representing different rake scores). Aquatic vegetation was present at 45 of the sites. A total of 10 species were collected of which 9 were native. The maximum number of species per site was 4 while the mean species per site was 1.70.

Table 4. Occurrence and abundance of submersed aquatic plants in Millpond Lake August 15, 2006.

Occurrence and abundance of submersed aquatic plants in Mill Pond Lake						
County: Marshall		Sites with plants: 45			Mean species/site: 1.70	
Date: 8/15/2006		Sites with native plants: 45			Standard error (ms/s): 0.18	
Secchi (ft): 8		Number of species: 10			Mean native species/site: 1.68	
Maximum plant depth (ft): 15		Number of native species: 9			Standard error (mns/s): 0.18	
Trophic status Mesotrophic		Maximum species/site: 4			Species diversity: 0.69	
Total sites: 50					Native species diversity: 0.65	
All depths (0 to 15 ft)	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	90.0	10.0	12.0	20.0	58.0	70.0
common bladderwort	20.0	80.0	0.0	4.0	16.0	4.8
watermeal	12.0	88.0	0.0	2.0	10.0	2.4
giant duckweed	12.0	88.0	0.0	2.0	10.0	2.4
common duckweed	12.0	88.0	0.0	2.0	10.0	2.4
Illinois pondweed	8.0	92.0	0.0	2.0	6.0	4.8
largeleaf pondweed	8.0	92.0	2.0	0.0	6.0	4.8
star duckweed	4.0	96.0	0.0	0.0	4.0	0.8
Eurasian watermilfoil	2.0	98.0	0.0	2.0	0.0	0.4
sago pondweed	2.0	98.0	0.0	0.0	2.0	0.4
Depth: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	100.0	0.0	17.4	21.7	60.9	72.2
watermeal	26.1	73.9	0.0	4.3	21.7	5.2
giant duckweed	26.1	73.9	0.0	4.3	21.7	5.2
common bladderwort	26.1	73.9	0.0	4.3	21.7	7.0
common duckweed	26.1	73.9	0.0	4.3	21.7	5.2
largeleaf pondweed	17.4	82.6	4.3	0.0	13.0	10.4
Illinois pondweed	8.7	91.3	0.0	4.3	4.3	7.0
Eurasian watermilfoil	4.3	95.7	0.0	4.3	0.0	0.9
star duckweed	4.3	95.7	0.0	0.0	4.3	0.9
sago pondweed	4.3	95.7	0.0	0.0	4.3	0.9
Depth: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	94.1	5.9	5.9	17.6	70.5	82.4
common bladderwort	23.5	76.5	0.0	5.9	17.6	4.7
Illinois pondweed	11.8	88.2	0.0	0.0	11.8	4.7
star duckweed	5.9	94.1	0.0	0.0	5.9	1.2
Depth: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	60.0	40.0	10.0	20.0	30.0	44.0

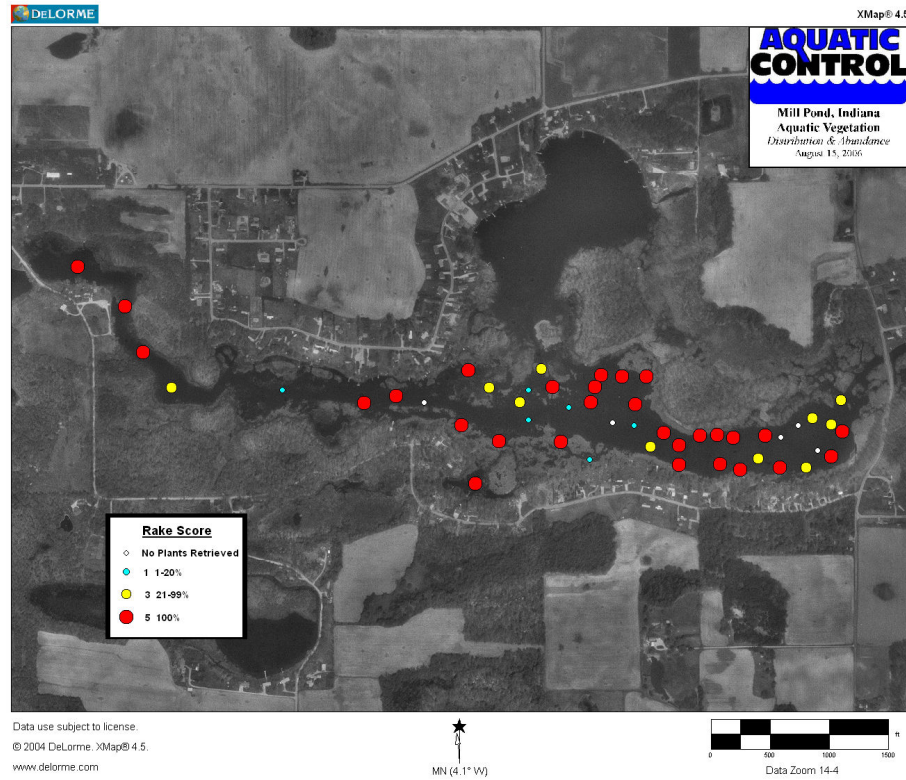


Figure 3. Millpond Lake, overall aquatic vegetation distribution and density, August 15, 2006.

Common coontail was present at the highest percentage of sample sites (90.0%) and also the highest dominance rating (Figure 4). Eurasian watermilfoil was collected at only a one site (Figure 5). Curlyleaf pondweed was not present in the Tier II survey. Largeleaf and Illinois pondweed were the second most abundant submersed species and were both found at 8% of sample sites.

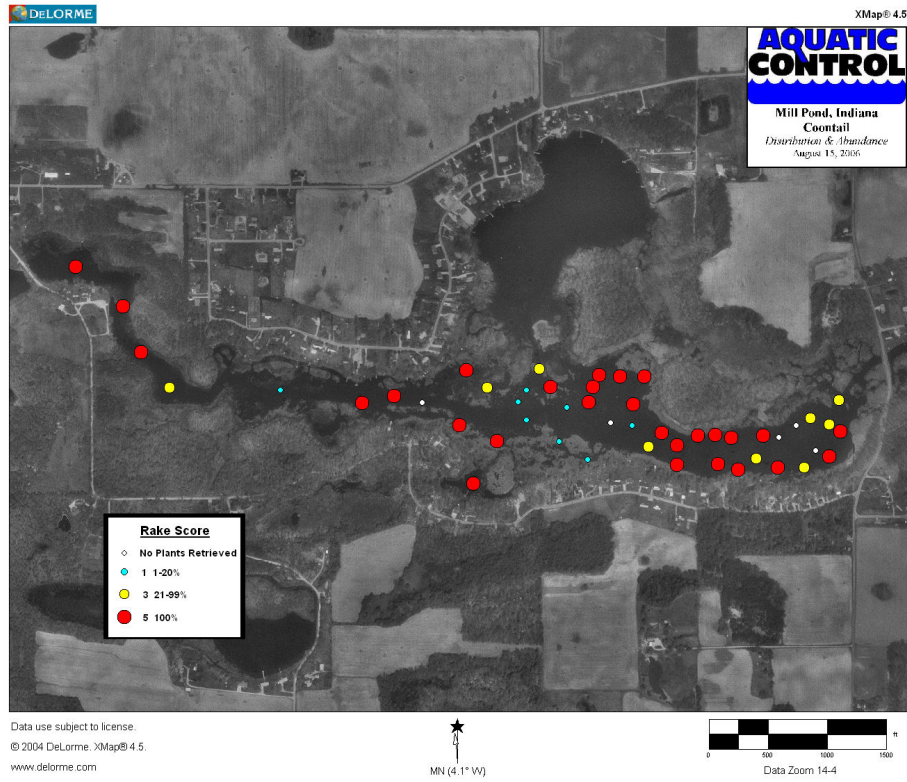


Figure 4. Millpond Lake, common coontail distribution and abundance, August 15, 2006.

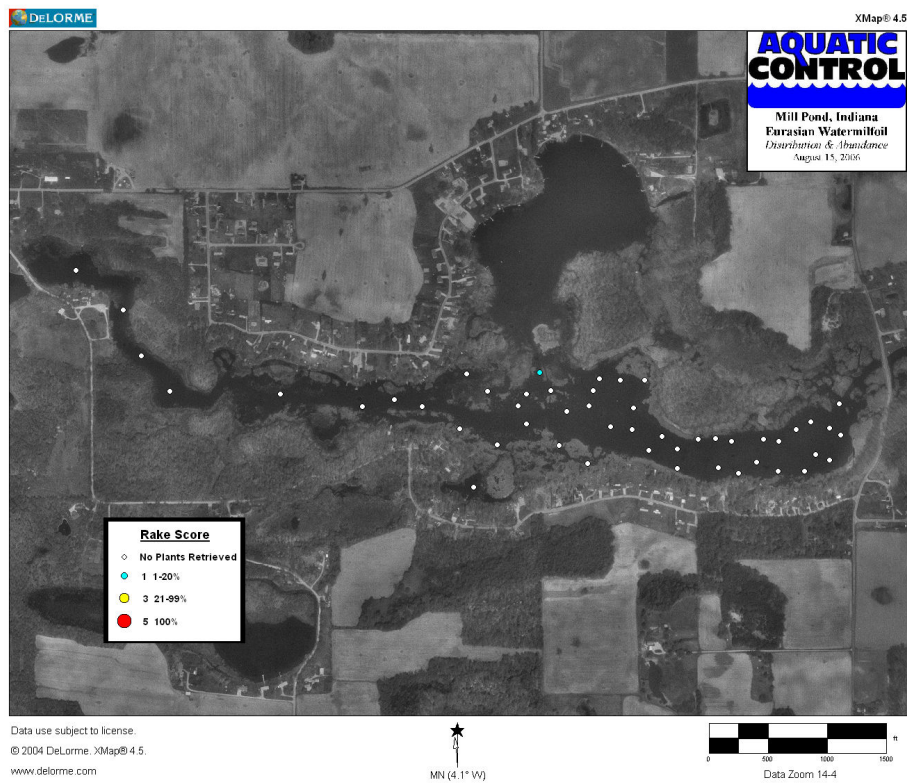


Figure 5. Millpond Lake, Eurasian watermilfoil distribution and abundance, August 15, 2006.

2.2 Kreighbaum Lake Sampling Results

2.2.1 May Survey-Kreighbaum Lake

On May 25, 2006 a Tier I survey was completed on Kreighbaum Lake. A Secchi disk reading was taken prior to sampling and was found to be 11.0 feet. Plants were present to a maximum depth of 16 feet. The total littoral zone size was estimated to be 19.4 acres. Nineteen different species were observed in six different plant beds. The largest plant bed was bed 1, which was comprised mainly of emergent and rooted floating vegetation. Eurasian watermilfoil was observed in all of the plant beds, but only scored an abundance rating of 3 or higher in beds 3 and 5 (Table 5 and Figure 6). Beds 3 and 5 included an area of approximately 2.2 acres. Curlyleaf pondweed was only observed in beds 3 and 5 at a relatively low density.

Table 5. Kreighbaum Lake Tier I Survey, May 25, 2006.

Lake: Kreighbaum		Number of plant beds: 6					
Date: 5/25/06		Number of species: 19					
Secchi: 11.0		Littoral zone size: 19.4					
Littoral zone max depth: 16							
Plant Bed I.D.		1	2	3	4	5	6
Plant Bed Size (acres)		10.6	0.8	0.7	2.3	1.5	3.5
spatterdock		4	-	1	1	2	1
white water lily		2	-	1	1	1	1
American elodea		1	-	-	-	-	2
variable pondweed		1	-	-	-	-	2
Illinois pondweed		1	-	-	-	-	2
largeleaf pondweed		2	3	-	-	-	2
flatstem pondweed		1	1	1	-	-	1
small pondweed		1	-	-	-	-	1
sago pondweed		1	-	-	-	-	2
arrowhead		1	-	-	-	-	-
purple loosestrife		2	-	-	-	-	-
smartweed		1	-	-	-	-	-
pickeral weed		1	-	-	-	-	-
common duckweed		1	1	-	-	-	-
Eurasian watermilfoil		1	1	3	1	4	1
common coontail		2	2	3	3	-	2
chara		1	1	1	2	-	-
common cattail		2	-	-	-	-	-
curlyleaf pondweed		-	-	2	-	1	-

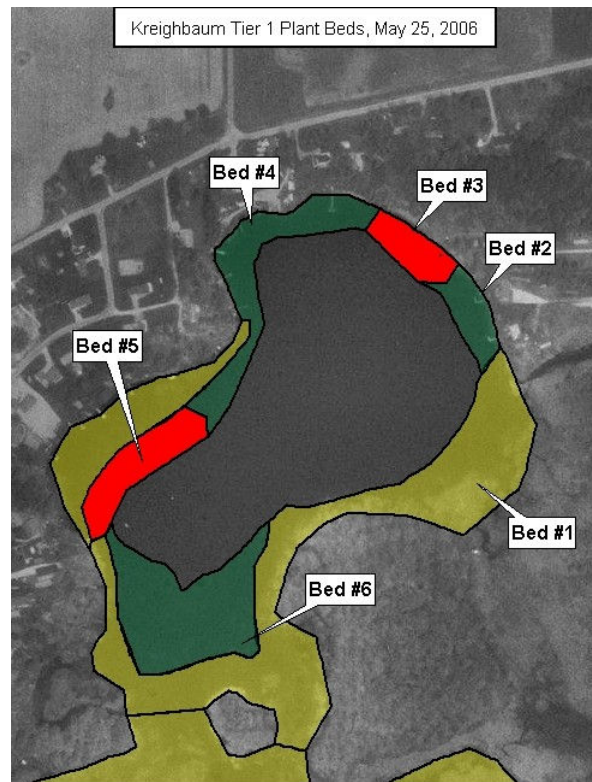


Figure 6. Kreighbaum Lake, Tier I plant beds, May 25, 2006.

2.2.2 August survey, Kreighbaum Lake

A second round of sampling was completed on Kreighbaum Lake on August 16, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 7.0 feet. The Tier I survey revealed 5 different plant beds and 18 different species (Table 6 & Figure 7). Plants were growing to a maximum depth of 15 feet. The littoral zone area was estimated to be 18.0 acres. Plant bed 1 was the largest plant bed and was dominated by emergent and rooted-floating vegetation. Purple loosestrife received an abundance rating of 2 in plant bed 1. Curlyleaf pondweed was the only invasive exotic submersed species observed and it was present in only plant bed 3 with an abundance rating of 1. Eurasian watermilfoil was not observed during the Tier I survey.

Table 6. Kreighbaum Lake Tier I Survey Results, August 16, 2006.

Lake: Kreighbaum		Number of plant beds: 5				
Date: 8/16/06		Number of species: 18				
Secchi: 7.0		Littoral zone size: 18				
Littoral zone max depth: 15						
Plant Bed I.D.		1	2	3	4	5
Plant Bed Size (acres)		11.1	2.6	0.3	0.4	3.6
spatterdock	4	-	1	-	-	-
pickeral weed	1	-	-	-	-	-
white water lily	2	-	1	1	1	1
common cattail	2	-	-	-	-	-
purple loosestrife	2	-	-	-	-	-
smartweed	1	-	-	-	-	-
arrow arum	1	-	-	-	-	-
common bladderwort	1	1	1	-	-	-
swamp loosestrife	3	-	-	-	-	-
floatingleaf pondweed	-	1	-	-	-	-
Illinois pondweed	-	2	3	1	1	1
common coontail	-	2	3	-	-	2
largeleaf pondweed	-	1	3	1	-	-
southern naiad	-	-	3	-	-	2
Chara	-	-	1	4	2	2
curlyleaf pondweed	-	-	1	-	-	-
slender naiad	-	-	3	-	-	-
small pondweed	-	-	-	-	-	4

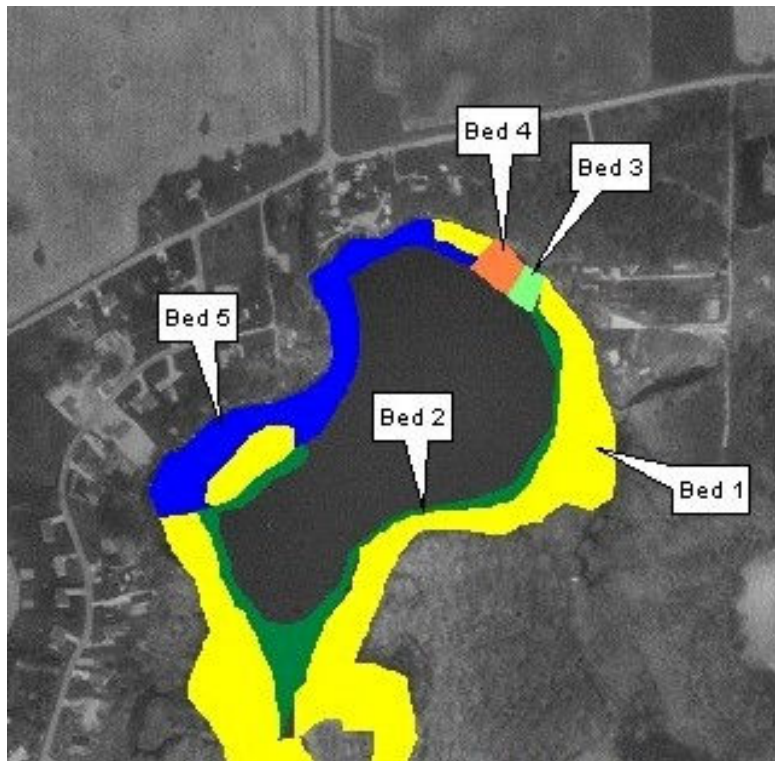


Figure 7. Kreighbaum Lake, Tier I plant beds, August 16, 2006.

On August 16, 2006 a Tier II survey was completed on Kreighbaum Lake following the Tier I survey. A total of 30 sites were sampled throughout the littoral zone (10 sample sites from 0-5ft, 10 sites 5-10ft, 7 sites 10-15 ft, and 3 sites 15-20ft). Sample sites should be limited to a depth of 15 feet next season since no plants were sampled deeper than 15.0 feet. Results of the sampling are listed in Table 7. Overall aquatic vegetation distribution and density is illustrated in Figure 8. Aquatic vegetation was present at 26 of the sites. A total of 8 species were collected of which all 8 were native. The maximum number of species per site was 3 while the mean species per site was 1.27.

Table 7. Occurrence and Abundance of Submersed Aquatic Plants In Kreighbaum Lake, August 16, 2006.

Occurrence and abundance of submersed aquatic plants in Kreighbaum Lake						
County: Marshall		Sites with plants: 26		Mean species/site: 1.27		
Date: 8/16/2006		Sites with native plants: 26		Standard error (ms/s): 0.15		
Secchi (ft): 7		Number of species: 8		Mean native species/site: 1.27		
Maximum plant depth (ft): 15		Number of native species: 8		Standard error (mns/s): 0.15		
Trophic status Mesotrophic		Maximum species/site: 3		Species diversity: 0.68		
Total sites: 30				Native species diversity: 0.68		
All depths (0 to 15 ft)	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	66.7	33.1	20.0	10.0	36.7	44.0
Illinois pondweed	16.7	83.3	6.7	0.0	10.0	7.3
small pondweed	13.3	86.7	3.3	3.3	6.7	5.3
slender naiad	10.0	90.0	0.0	3.3	6.7	8.7
Chara	6.7	93.3	0.0	0.0	6.7	4.0
common bladderwort	6.7	93.3	3.3	0.0	3.3	1.3
southern naiad	3.3	96.7	0.0	0.0	3.3	0.7
largeleaf pondweed	3.3	96.7	0.0	0.0	3.3	2.0
Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	50.0	50.0	20.0	0.0	30.0	34.0
small pondweed	40.0	60.0	10.0	10.0	20.0	16.0
Illinois pondweed	30.0	70.0	10.0	0.0	20.0	10.0
slender naiad	30.0	70.0	0.0	10.0	20.0	26.0
chara	20.0	80.0	0.0	0.0	20.0	12.0
southern naiad	10.0	90.0	0.0	0.0	10.0	2.0
largeleaf pondweed	10.0	90.0	0.0	0.0	10.0	6.0
common bladderwort	10.0	90.0	0.0	0.0	10.0	2.0
Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	80.0	20.0	10.0	20.0	50.0	56.0
Illinois pondweed	20.0	80.0	10.0	0.0	10.0	12.0
Depth: 10 to 15 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	100.0	0.0	42.9	14.3	42.9	60.0
common bladderwort	14.3	85.7	14.3	0.0	0.0	3.3

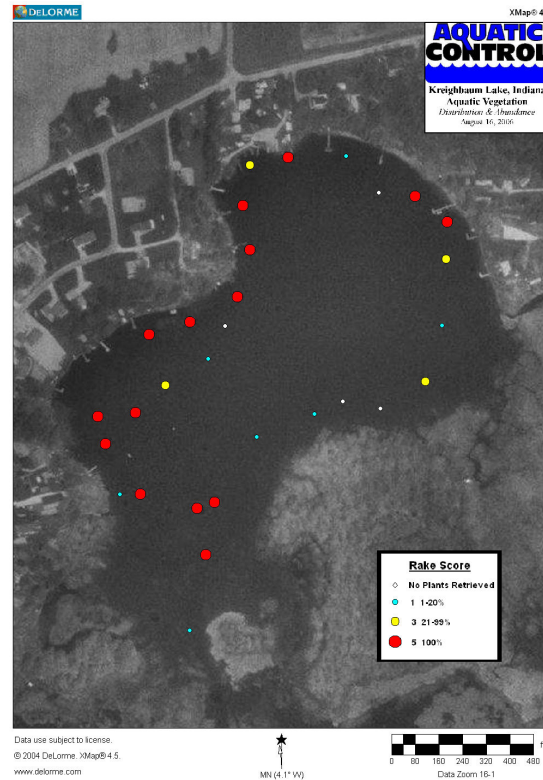


Figure 8. Kreighbaum Lake, aquatic vegetation distribution and abundance, August 16, 2006

Common coontail was present at the highest percentage of sample sites (66.7%) and also the highest dominance rating (Figure 9). Illinois pondweed ranked second in site frequency (16.7%). Distribution and abundance of Illinois pondweed is illustrated in Figure 10. Small pondweed and common naiad were both collected at more than 10% of sample sites. Eurasian watermilfoil and curlyleaf pondweed were not collected in the Tier II survey.

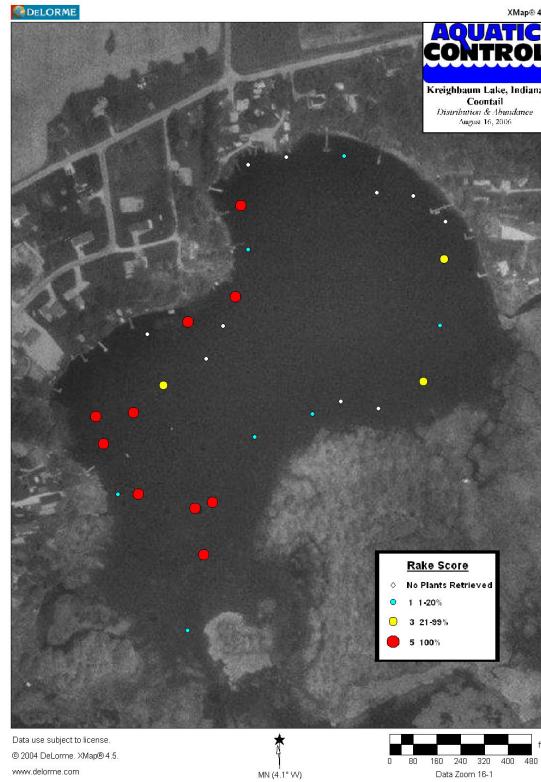


Figure 9. Kreighbaum Lake, common coontail distribution and abundance, August 16, 2006

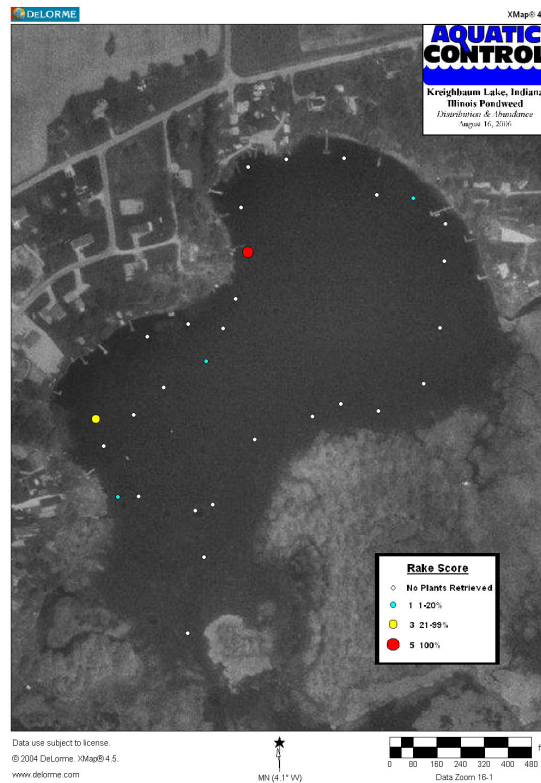


Figure 10. Kreighbaum Lake, Illinois pondweed distribution and abundance, August 16, 2006

2.3 Cook Lake Sampling Results

2.3.1 May Survey, Cook Lake

On May 25, 2006 a Tier I survey was completed on Cook Lake. A Secchi disk reading was taken prior to sampling and was found to be 6.5 feet. Plants were present to a maximum depth of 11.0 feet. The total littoral zone size was estimated to be 45.7 acres. Fourteen different species were observed in four different plant beds. Eurasian watermilfoil was one of the most abundant species. Milfoil was found in all four beds and received an abundance rating of 4 in the plant bed 2 (Table 8 and Figure 11). Plant bed 2 was the largest plant bed at 22.0 acres. Eurasian watermilfoil was topped out throughout much of bed 2. Curlyleaf pondweed was also present in all of the plant beds and received an abundance rating of 3 in plant bed 3.

Table 8. Cook Lake Tier I Survey Results, May 25, 2006.

Lake Name: Cook		Number of plant beds: 4		
Date: 5/25/06		Number of species: 14		
Secchi: 6.5		Littoral zone size: 45.7		
Littoral zone max depth: 11.0'				
Plant Bed I.D.	1	2	3	4
Plant Bed Size (acres)	19.9	22.0	1.6	3.7
spatterdock	3	-	2	-
purple loosestrife	3	-	-	-
white water lily	2	2	3	1
Eurasian watermilfoil	1	4	2	2
curlyleaf pondweed	1	3	2	2
common coontail	1	2	-	-
smartweed	1	-	-	-
pickeral weed	1	-	-	-
common cattail	3	-	-	-
Chara	1	-	-	-
largeleaf pondweed	-	1	-	4
small pondweed	-	1	-	-
flatstem pondweed	-	1	-	-
American elodea	-	1	-	1

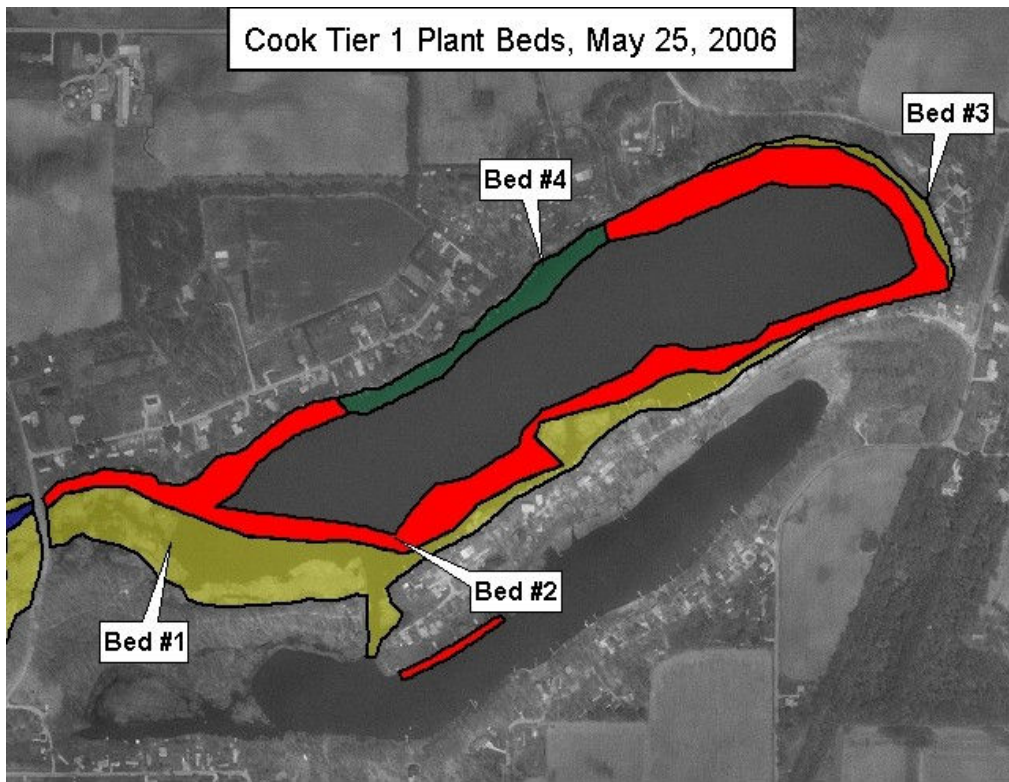


Figure 11. Cook Lake, Tier I survey results, May 25, 2006.

2.3.2 August Survey, Cook Lake

A second round of sampling was completed on Cook Lake on August 15, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 6.0 feet. The Tier I survey revealed 3 different plant beds and 19 different species. Plants were growing to a maximum depth of 15 feet. The littoral zone area was estimated to be 41.2 acres. Eurasian watermilfoil was not observed during this survey. Curlyleaf pondweed was only observed in plant bed 3 and received the lowest abundance rating (Table 9 and Figure 12). Bed 1 was the largest plant bed and was comprised primarily of emergent and rooted floating vegetation. Purple loosestrife was dense throughout bed 1.

Table 9. Cook Lake Tier I Survey Results, August 16, 2006.

Lake Name: Cook		Number of plant beds: 3	
Date: 8/16/06		Number of species: 19	
Secchi:6.0		Littoral zone size: 41.2	
Littoral zone max depth: 15			
Plant Bed I.D.	1	2	3
Plant Bed Size (acres)	17.9	17.3	6.0
spatterdock	4	2	2
white water lily	4	2	2
pickeral weed	1	-	-
arrow arum	1	-	-
purple loosestrife	4	-	-
common cattail	4	-	-
arrowhead	1	-	-
phragmites	1	-	-
common coontail	2	2	2
common bladderwort	1	-	-
swamp loosestrife	3	-	-
watermeal	2	2	-
common duckweed	2	2	-
star duckweed	1	-	-
largeleaf pondweed	-	-	3
small pondweed	-	-	2
southern naiad	-	-	1
eel grass	-	-	1
curlyleaf pondweed	-	-	1

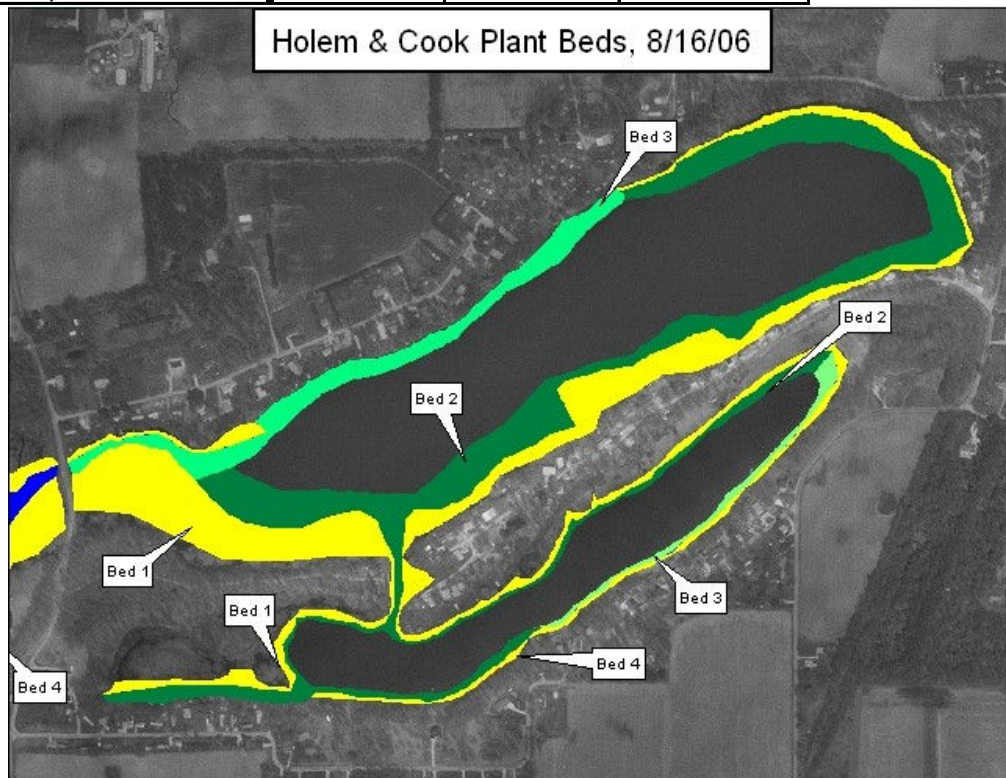


Figure 12. Cook Lake, Tier I plant beds, August 16, 2006.

On August 16, 2006 a Tier II survey was completed on Cook Lake following the Tier I survey. A total of 40 sites were sampled throughout the littoral zone (17 sample sites from 0-5ft, 13 sites 5-10ft, and 10 sites 10-15 ft). These same sites should be used again next season and floating vegetation should not be included in next season's sample results. Results of the sampling are listed in Table 10 and distribution and abundance of aquatic vegetation is illustrated in Figure 13. Aquatic vegetation was present at 34 of the sites. A total of 8 species were collected of which all were native. The maximum number of species per site was 3 while the mean number of species per site was 1.10.

Table 10. Occurrence and Abundance of Submersed Aquatic Plants In Cook Lake, August 16, 2006.

Occurrence and abundance of submersed aquatic plants in Cook Lake						
County: Marshall		Sites with plants: 34		Mean species/site: 1.10		
Date: 8/16/2006		Sites with native plants: 34		Standard error (ms/s): 0.11		
Secchi (ft): 6		Number of species: 8		Mean native species/site: 1.10		
Maximum plant depth (ft): 15		Number of native species: 8		Standard error (mns/s): 0.11		
Trophic status Eutrophic		Maximum species/site: 3		Species diversity: 0.53		
Total sites: 40				Native species diversity: 0.53		
All depths (0 to 15 ft)	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	75.0	25.0	17.5	12.5	45.0	51.0
largeleaf pondweed	17.5	82.5	5.0	2.5	10.0	11.5
Chara	5.0	95.0	2.5	0.0	2.5	3.0
southern naiad	5.0	95.0	2.5	0.0	2.5	1.0
star duckweed	2.5	97.5	2.5	0.0	0.0	0.5
watermeal	2.5	97.5	0.0	0.0	2.5	0.5
common duckweed	2.5	97.5	0.0	0.0	2.5	0.5
eel grass	2.5	97.5	2.5	0.0	0.0	0.5
Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	70.6	29.4	29.4	5.9	35.3	32.9
largeleaf pondweed	35.3	64.7	11.8	5.9	17.6	21.2
Chara spp.	11.8	88.2	5.9	0.0	5.9	7.1
southern naiad	11.8	88.2	5.9	0.0	5.9	2.4
star duckweed	5.9	94.1	5.9	0.0	0.0	1.2
watermeal	5.9	94.1	0.0	0.0	5.9	1.2
common duckweed	5.9	94.1	0.0	0.0	5.9	1.2
eel grass	5.9	94.1	5.9	0.0	0.0	1.2
Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	84.6	14.4	0.0	23.1	61.5	75.4
largeleaf pondweed	7.7	92.3	0.0	0.0	7.7	7.7
Depth: 10 to 15 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	70.0	30.0	20.0	10.0	40.0	50.0

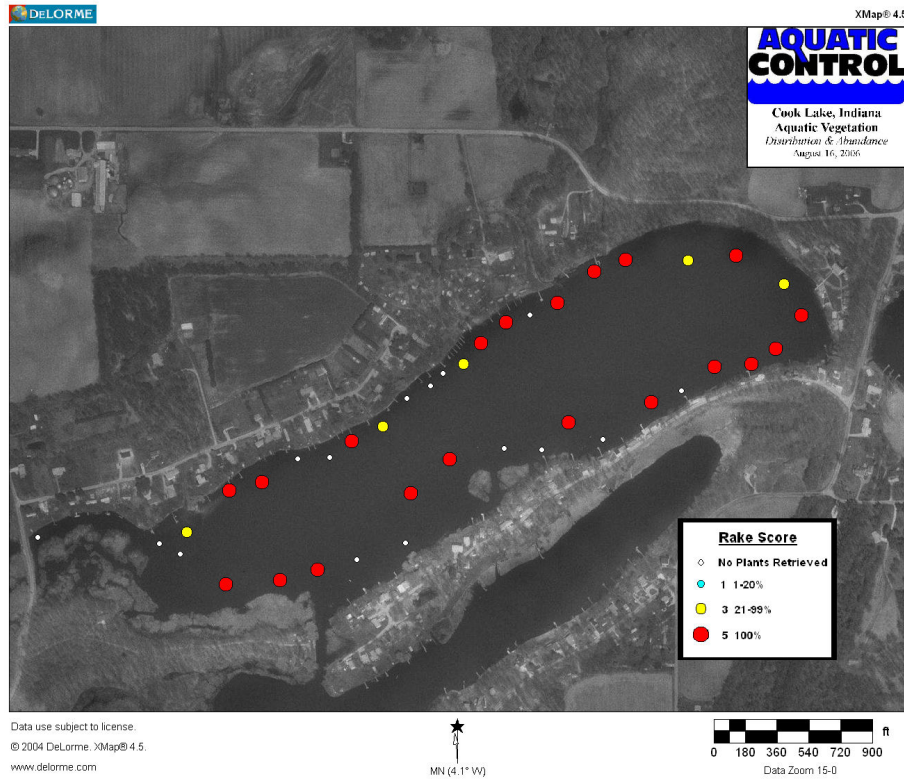


Figure 13. Cook Lake, aquatic vegetation distribution and abundance, August 16, 2006.

Common coontail was present at the highest percentage of sample sites (75.0%) and also the highest dominance rating (Figure 14). Largeleaf pondweed ranked second in site frequency (17.5%). Eel grass, southern naiad, and Chara were the only other submersed species collected.

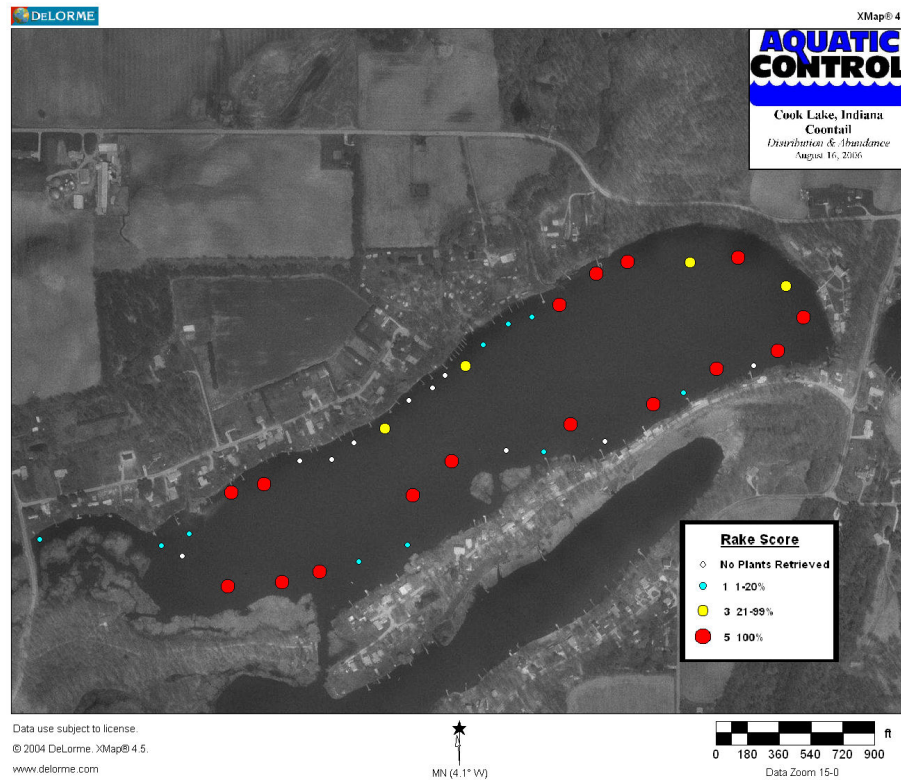


Figure 14. Cook Lake, coontail distribution and abundance, August 16, 2006

2.4 Holem Lake Sampling Results

2.4.1 May Survey, Holem Lake

On May 25, 2006 a Tier I survey was completed on Holem Lake. A Secchi disk reading was taken prior to sampling and was found to be 6.5 feet. Plants were present to a maximum depth of 11.0 feet. The total littoral zone size was estimated to be 7.9 acres. Fifteen different species were observed in five different plant beds (Table 11 & Figure 15). Eurasian watermilfoil received an abundance rating of 3 in plant bed 5. This bed was measured and found to be 1.0 acres. Curlyleaf pondweed was dense in plant bed 2. Plant bed 1 is rather unique for Holem Lake. This plant bed is made up of emergent and rooted floating vegetation that runs the entire shoreline (bed 1).

Table 11. Holem Lake Tier I Survey Results, May 25, 2006.

Lake Name: Holem		Number of plant beds: 5			
Date: 5/25/06		Number of species: 15			
Secchi: 6.5		Littoral zone size: 7.9			
Littoral zone max depth: 11.0					
Plant Bed I.D.	1	2	3	4	5
Plant Bed Size (acres)	1.5	1.6	1.3	2.5	1.0
Chara	3	-	4	2	-
common cattail	3	3	2	-	2
Eurasian watermilfoil	1	2	1	-	3
variable pondweed	1	1	-	1	-
Illinois pondweed	1	1	1	1	-
largeleaf pondweed	1	1	-	1	1
common coontail	2	1	-	2	-
spatterdock	1	1	-	1	1
white water lily	2	1	-	2	1
arrowhead	1	-	-	1	-
flastem pondweed	1	-	-	1	-
purple loosestrife	1	-	-	2	-
small pondweed	1	-	-	1	-
curlyleaf pondweed	-	3	-	-	1
American elodea	-	1	-	-	-

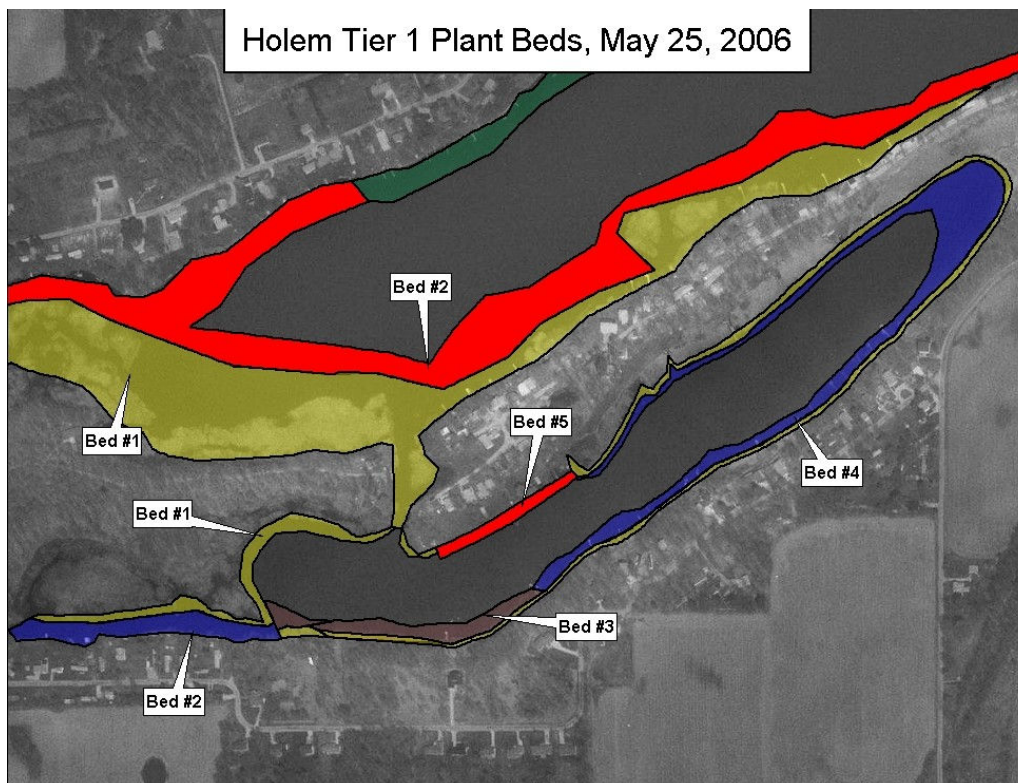


Figure 15. Holem Lake, Tier I survey results, May 25, 2006.

2.4.2 August Survey, Holem Lake

A second round of sampling was completed on Holem Lake on August 16, 2006. Tier I and Tier II surveys were completed at this time. A Secchi measurement was taken prior to sampling and found to be 6.5 feet. The Tier I survey revealed 4 different plant beds and 18 different species. Plants were growing to a maximum depth of 15 feet. The littoral zone area was estimated to be 16.0 acres. Eurasian watermilfoil was observed only in plant bed 2 at an abundance rating of 1. Curlyleaf pondweed was also observed in bed 2 with the same abundance rating (Table 12 and Figure 16). Bed 1 was the largest plant bed and was comprised primarily of emergent and rooted floating vegetation.

Table 12. Holem Lake Tier I Survey Results, August 16, 2006.

Lake: Holem		Number of plant beds: 4			
Date: 8/16/06		Number of species: 18			
Secchi: 6.5		Littoral zone size: 16			
Littoral zone max depth: 15					
Plant Bed I.D.	1	2	3	4	
Plant Bed Size (acres)	5.4	5.3	1.3	4.0	
spatterdock	3	-	-	2	
white water lily	3	-	-	2	
pickeral weed	1	-	-	-	
common cattail	4	-	-	3	
purple loosestrife	4	-	-	2	
arrow arum	1	-	-	2	
common coontail	2	4	2	3	
watershield	1	-	-	-	
Chara	4	3	4	-	
swamp loosestrife	3	-	-	-	
arrowhead	1	-	-	-	
Eurasian watermilfoil	-	1	-	-	
Illinois pondweed	-	2	1	-	
flatstem pondweed	-	1	-	-	
curlyleaf pondweed	-	1	-	-	
small pondweed	-	2	-	-	
common bladderwort	-	1	-	-	
phragmites	-	-	-	1	

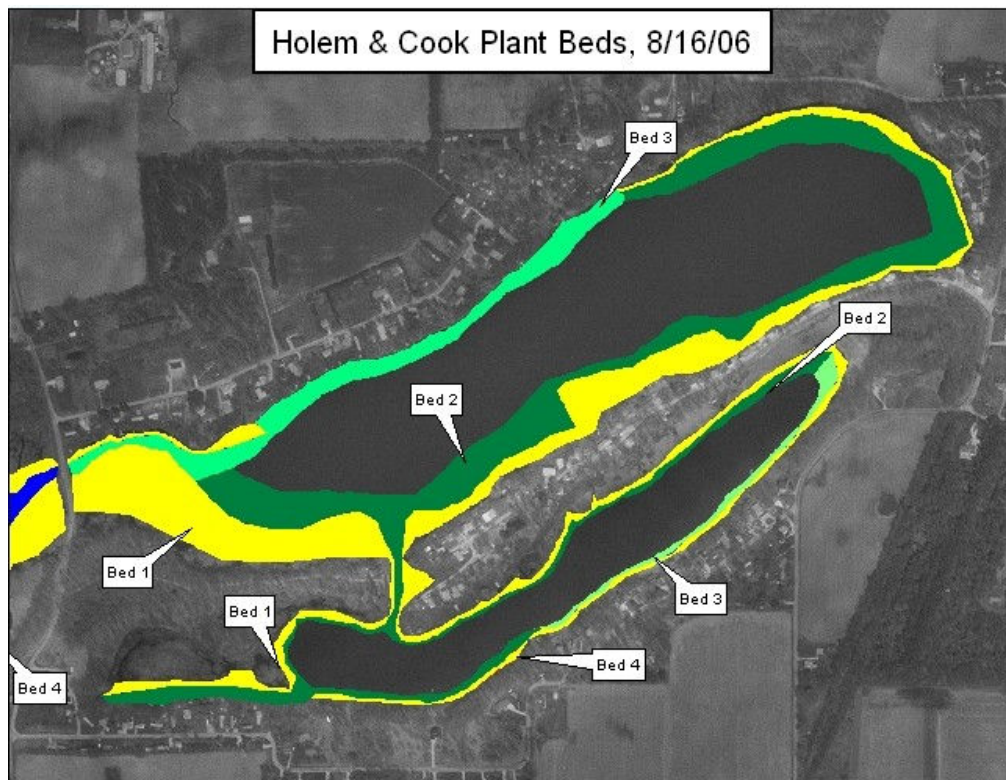


Figure 16. Holem Lake, Tier I plant beds, August 16, 2006.

On August 16, 2006 a Tier II survey was completed on Holem Lake following the Tier I survey. A total of 30 sites were sampled throughout the littoral zone (10 sample sites from 0-5ft, 10 sites 5-10ft, and 10 sites 10-15 ft). These same sites should be used again next season. Results of the sampling are listed in Table 13 and distribution and abundance of aquatic vegetation is illustrated in Figure 17. All of the sample sites contained native aquatic vegetation. A total of 6 species were collected of which 5 were native. The maximum number of species per site was 3 while the mean number of species per site was 1.77.

Table 13. Occurrence and Abundance of Submersed Aquatic Plants In Holem Lake, August 16, 2006.

Occurrence and abundance of submersed aquatic plants in Holem Lake						
County: Marshall		Sites with plants: 30		Mean species/site: 1.77		
Date: 8/16/2006		Sites with native plants: 30		Standard error (ms/s): 0.14		
Secchi (ft): 12		Number of species: 6		Mean native species/site: 1.70		
Maximum plant depth (ft): 15		Number of native species: 5		Standard error (mns/s): 0.13		
Trophic status Mesotrophic		Maximum species/site: 3		Species diversity: 0.63		
Total sites: 30				Native species diversity: 0.44		
All depths (0 to 15 ft)	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	100.0	0.0	6.7	6.7	86.7	84.0
Illinois pondweed	26.7	73.3	0.0	3.3	23.3	16.0
Chara	20.0	80.0	0.0	0.0	20.0	14.7
common bladderwort	20.0	80.0	0.0	0.0	20.0	4.0
Eurasian watermilfoil	6.7	93.3	0.0	0.0	6.7	1.3
northern watermilfoil	3.3	96.7	0.0	0.0	3.3	0.7
Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	100.0	0.0	10.0	20.0	70.0	60.0
Illinois pondweed	50.0	50.0	0.0	10.0	40.0	26.0
Chara	30.0	70.0	0.0	0.0	30.0	22.0
Eurasian watermilfoil	10.0	90.0	0.0	0.0	10.0	2.0
common bladderwort	10.0	90.0	0.0	0.0	10.0	2.0
Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	100.0	0.0	10.0	0.0	100.0	100.0
common bladderwort	40.0	60.0	0.0	0.0	40.0	8.0
Chara	30.0	70.0	0.0	0.0	30.0	22.0
Illinois pondweed	30.0	70.0	0.0	0.0	30.0	22.0
Eurasian watermilfoil	10.0	90.0	0.0	0.0	10.0	2.0
northern watermilfoil	10.0	90.0	0.0	0.0	10.0	2.0
Depth: 10 to 15 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
common coontail	100.0	0.0	10.0	0.0	90.0	92.0
common bladderwort	10.0	90.0	0.0	0.0	10.0	2.0

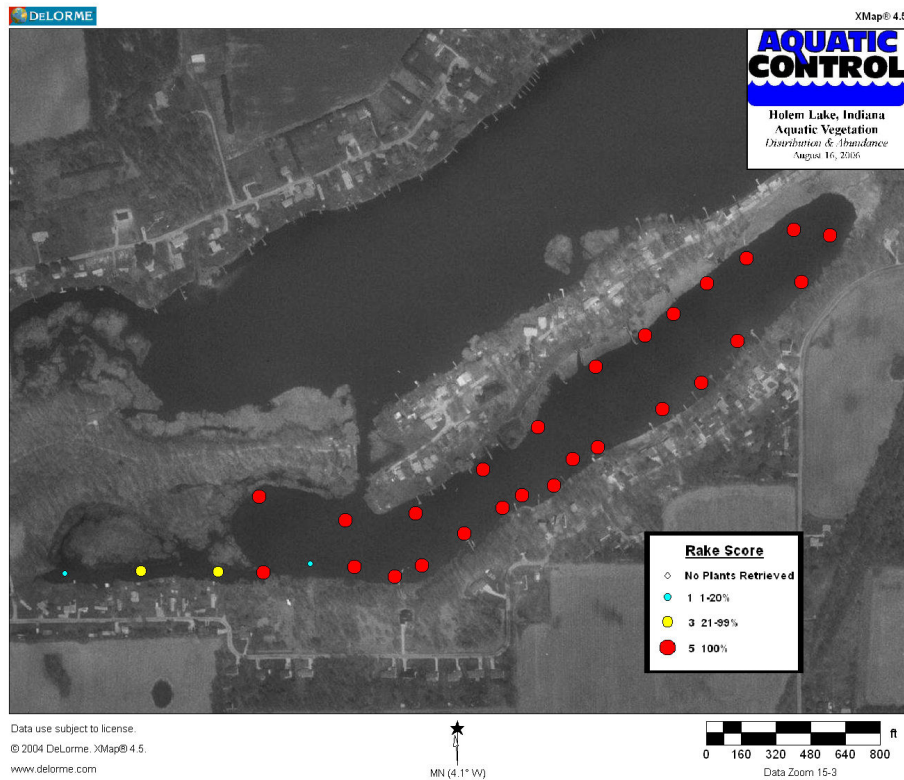


Figure 17. Holem Lake, aquatic vegetation distribution and abundance, August 16, 2006.

Common coontail was present at all of the sample sites (Figure 18). Illinois pondweed ranked second in frequency of occurrence (26.7%), followed by Chara and common bladderwort, which were present at 20% of the sites. Eurasian watermilfoil occurred at 6.7% of the sites which was the highest percentage found in the Four Lakes during the summer surveys (Figure 19).

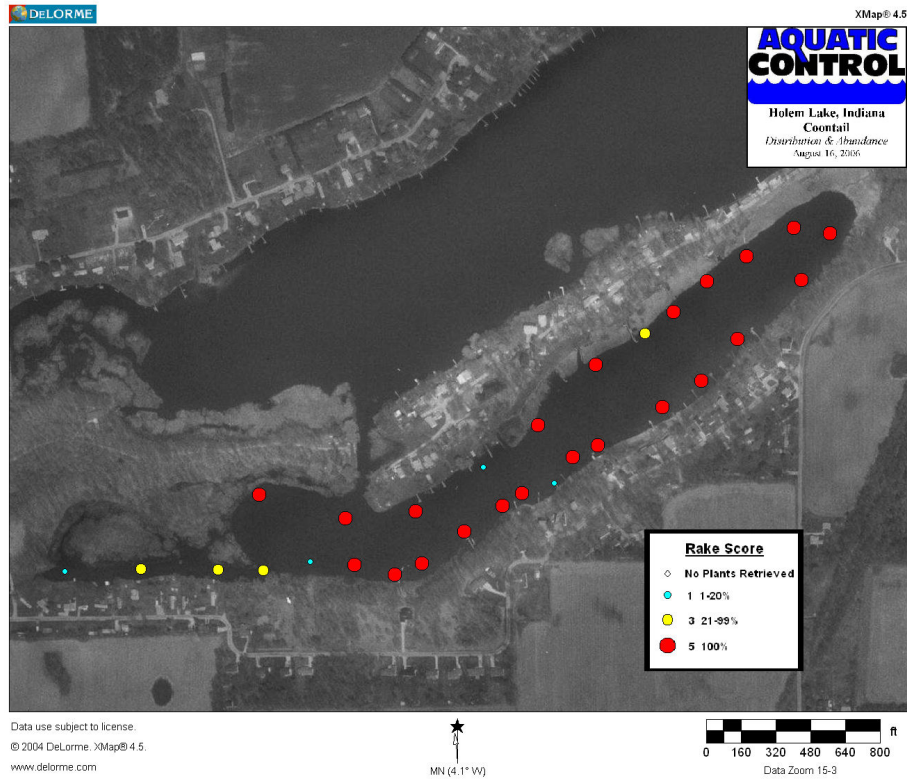


Figure 18. Holem Lake, coontail distribution and abundance, August 16, 2006

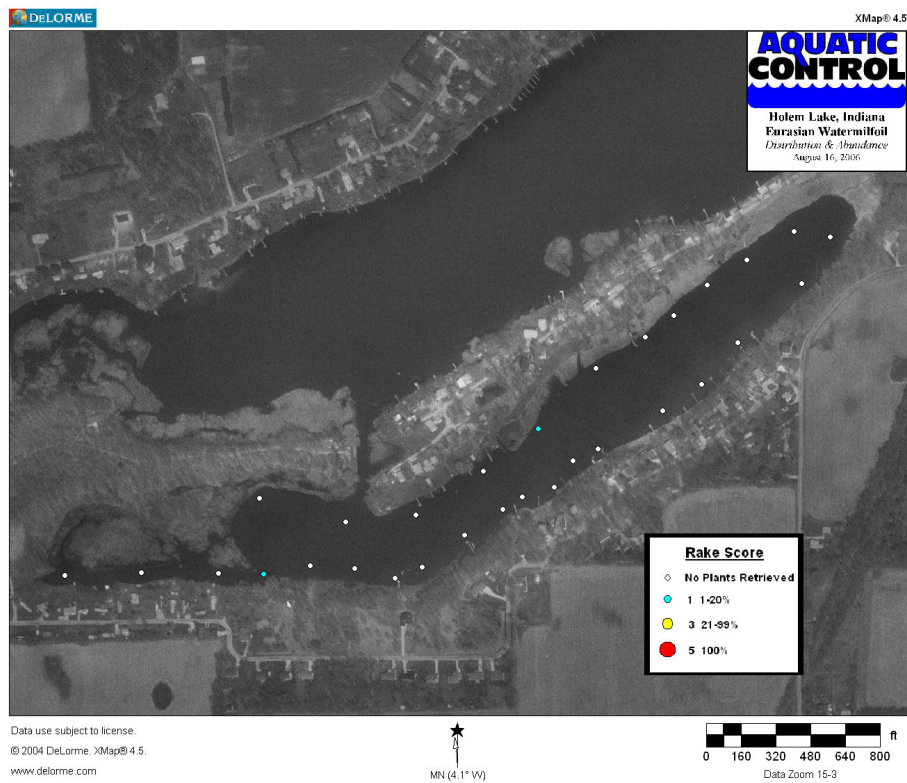


Figure 19. Holem Lake, Eurasian watermilfoil distribution and abundance, August 16, 2006.

2.5 Plant Sampling Discussion

The FLLA membership includes residents from all four lakes in the chain. These lakes are all connected to one another, but there are many differences in water quality, average depth, and shoreline development. These differences lead to variation in plant communities, and thus the plant sampling and sampling discussion focuses on the individual lakes.

2.5.1 Millpond Lake Sampling Discussion

Millpond Lake is the shallowest lake in the chain. There is only one small area near the east end of the lake that is too deep to grow submersed vegetation. This lake also has large areas of spatterdock and water lily beds. Due to the shallow nature of this lake, submersed vegetation can often reach nuisance levels that inhibit lake use. Typically, Eurasian watermilfoil is the primary nuisance species in the spring and summer months. However, some native species also reach nuisance levels. Over the past several years near shore treatments with contact herbicides have reduced nuisance conditions caused by native and exotic species, but Eurasian watermilfoil was allowed to flourish away from shore. This season LARE funded treatments were completed throughout the lake to control Eurasian watermilfoil. The LARE funded treatments were very effective at reducing milfoil abundance as Figure 20 illustrates.

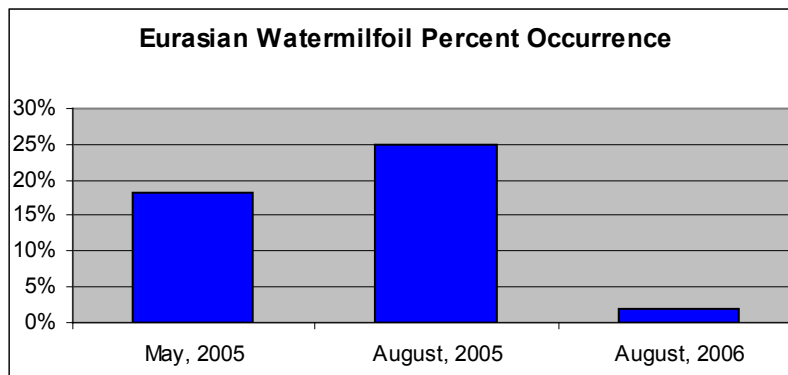


Figure 20. Millpond Lake, Eurasian watermilfoil percent occurrence in the last three surveys.

The LARE funded Eurasian watermilfoil treatment was intended to control Eurasian watermilfoil without significant damage to native species. A comparison of this summer's sampling data to data collected in 2005 appears to indicate that little to no native damage occurred (Figure 21-23).

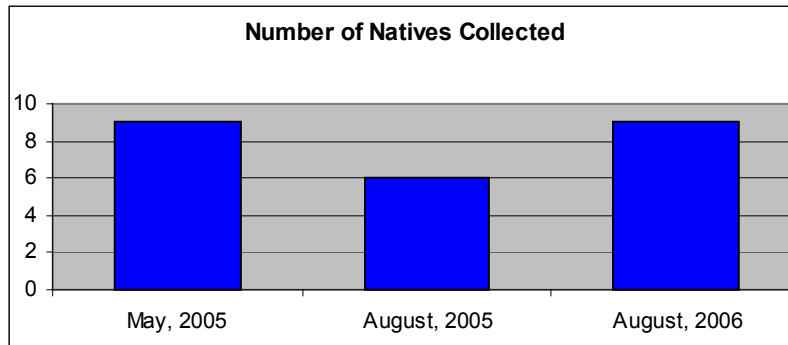


Figure 21. Millpond Lake, number of native species collected in the last three surveys.

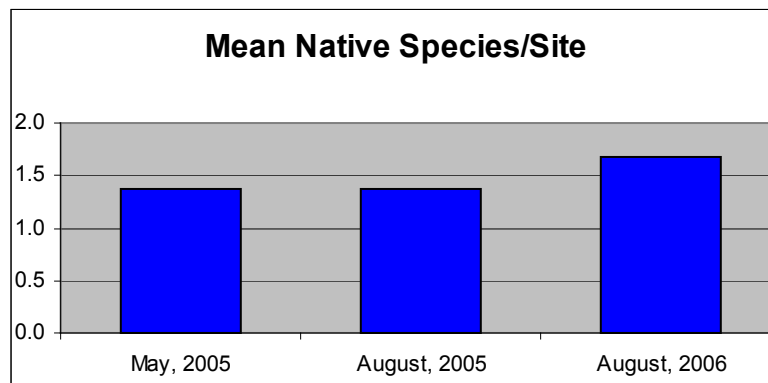


Figure 22. Millpond Lake, number of native species per site in the last three surveys.

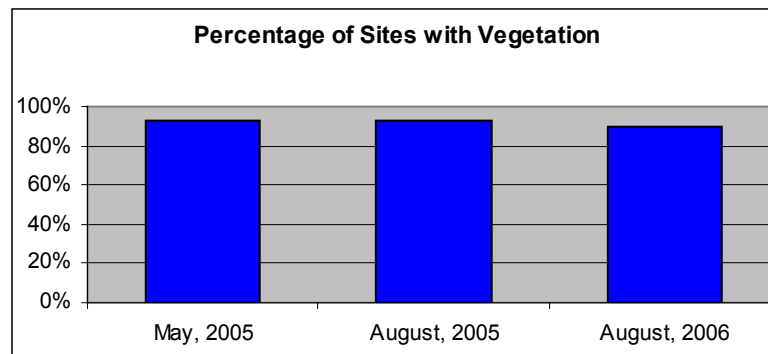


Figure 23. Millpond Lake, comparison of the percentage of sites with vegetation in the last three surveys.

2.5.2 Kreighbaum Lake Sampling Discussion

Kreighbaum Lake is much deeper than Millpond Lake and thus tends to develop less nuisance conditions caused by aquatic vegetation. Eurasian watermilfoil can cause problems in the shallow near-shore areas, but this is typically controlled with regular contact treatments. There are also large beds of emergent and rooted floating vegetation in the uninhabited shoreline areas of Kreighbaum Lake. Only two small sections of Kreighbaum Lake were treated for milfoil control, but it appeared to have a positive effect on reducing the abundance of this species (Figure 24).

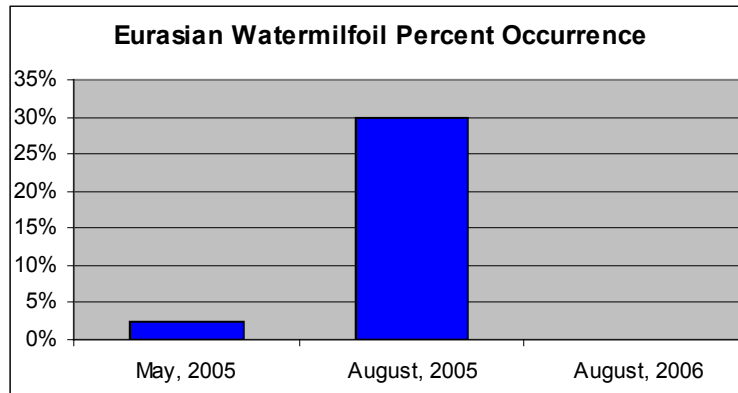


Figure 24. Kreighbaum Lake, Eurasian watermilfoil percent occurrence in the last three surveys.

There is abundant submersed vegetation in the limited shallow water areas of Kreighbaum Lake. Spot treatments were completed this season in order to open up areas for boat access. Despite the spot treatment and the selective milfoil treatments, it appears that Kreighbaum Lake continues to have abundant native vegetation (Figure 25-27).

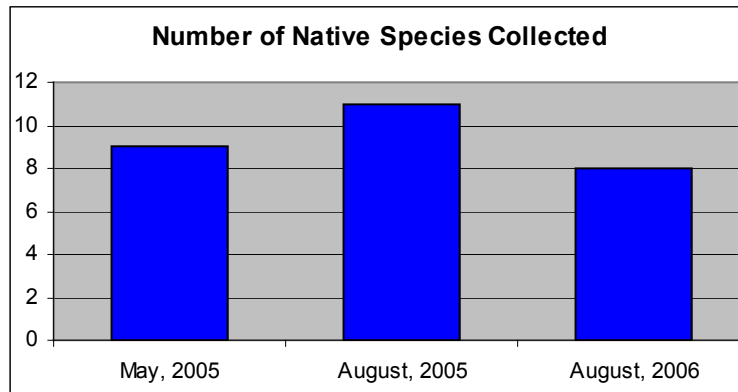


Figure 25. Kreighbaum Lake, number of native species collected in the last three surveys.

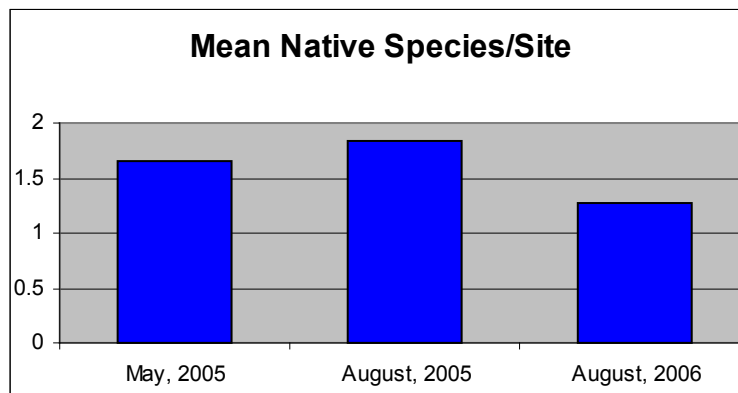


Figure 26. Kreighbaum Lake, number of native species per site in the last three surveys.

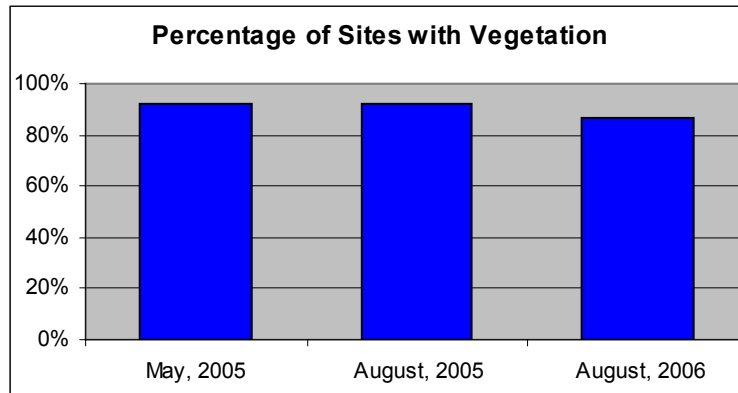


Figure 27. Kreighbaum Lake, comparison of the percentage of sites with vegetation in the last three surveys.

2.5.3 Cook Lake Sampling Discussion

Cook Lake is deeper than Millpond Lake, but also has experienced a severe Eurasian watermilfoil infestation. Much of the littoral zone that was not dominated by rooted floating vegetation was dominated by Eurasian watermilfoil. Cook Lake received a large percentage of the LARE funded treatment. This treatment was extremely effective, to the point that no milfoil was detected in the August Tier II survey (Figure 28).

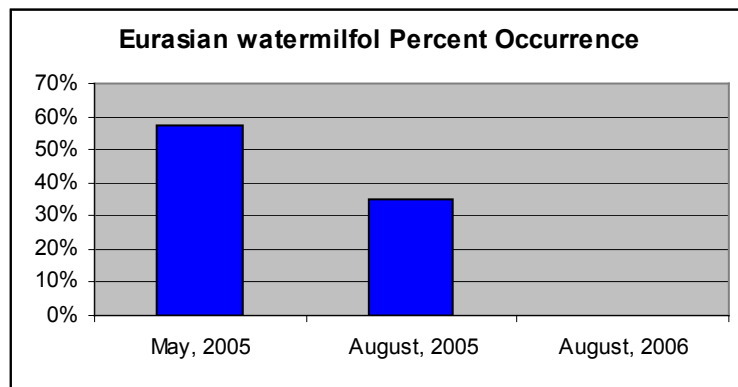


Figure 28. Cook Lake, Eurasian watermilfoil percent occurrence in the last three surveys.

There appeared to be no negative effect on native vegetation following spring herbicide applications. The reduction in milfoil likely improved the native submersed plant community. The results of the August Tier II survey are illustrated in Figures 29-31.

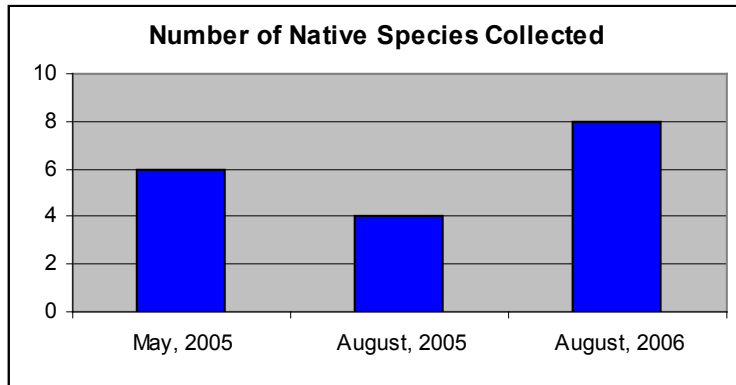


Figure 29. Cook Lake, number of species collected in the last three surveys.

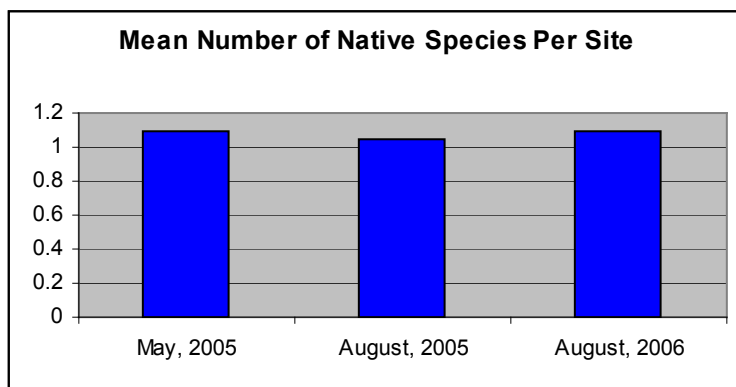


Figure 30. Cook Lake, mean number of native species per site in the last three surveys.

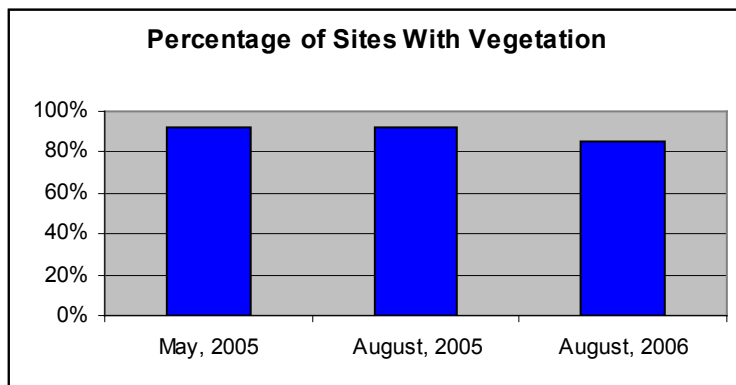


Figure 31. Cook Lake, percentage of sample sites with vegetation in the last three surveys.

2.5.4 Holem Lake Sampling Discussion

Holem Lake is a very unique waterbody for Indiana. The shallow margins of the lake are inhabited, but residents have left the emergent and rooted floating vegetation. This likely helps with water quality, fish habitat, and the overall health of Holem Lake. Holem Lake has more deep-water habitat than Cook and Millpond Lake, so it does not have the same problems with nuisance submersed species. During the spring sampling it was decided that only a small shoreline section required treatment for control of Eurasian watermilfoil. Milfoil was seen in other areas, but not at dense levels, and there were not enough funds to treat all areas of milfoil. It appears that this small treatment may have

had positive effects on reducing milfoil abundance (Figure 32). However, Holem Lake did contain the highest levels of milfoil of all the Four Lakes when comparing the August sampling data.

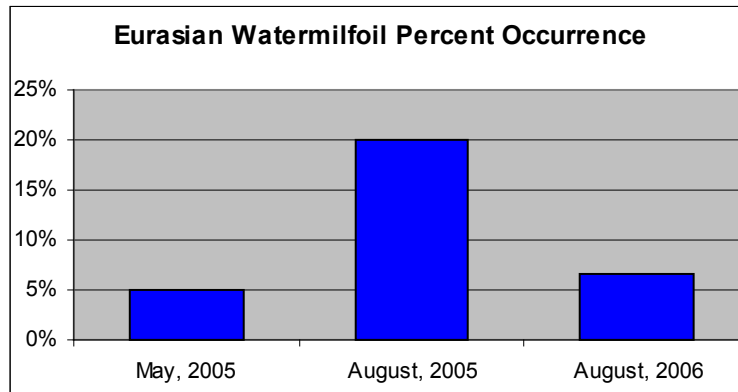


Figure 32. Holem Lake, Eurasian watermilfoil percent occurrence in the last three surveys.

The LARE funded Eurasian watermilfoil treatment was intended to control Eurasian watermilfoil without significant damage to native species. A comparison of this summer's sampling data to data collected in 2005 appears to indicate that little to no native damage occurred (Figure 33-35).

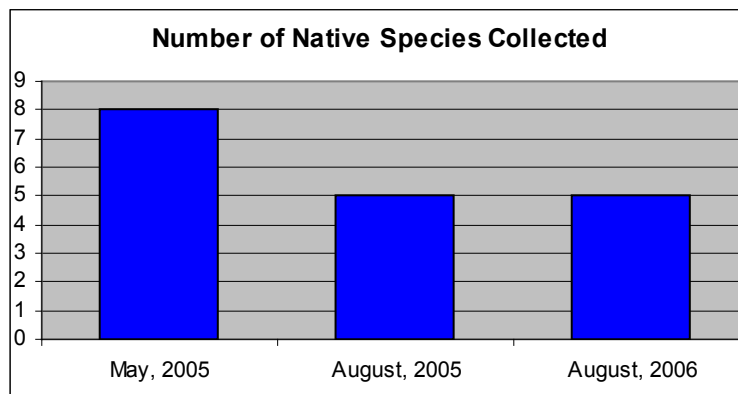


Figure 33. Holem Lake, number of native species collected in the last three surveys.

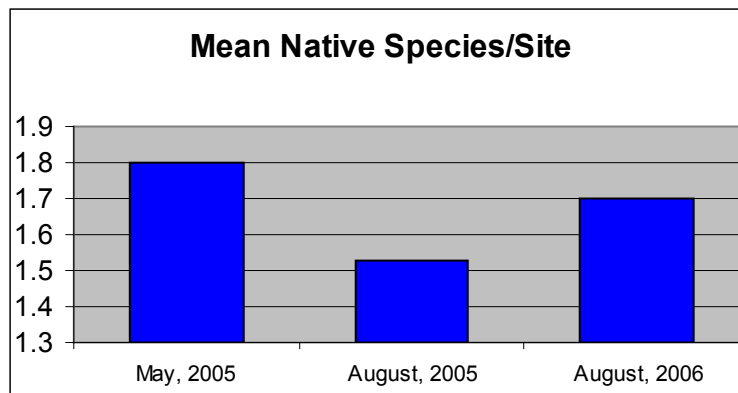


Figure 34. Holem Lake, number of native species per site in the last three surveys.

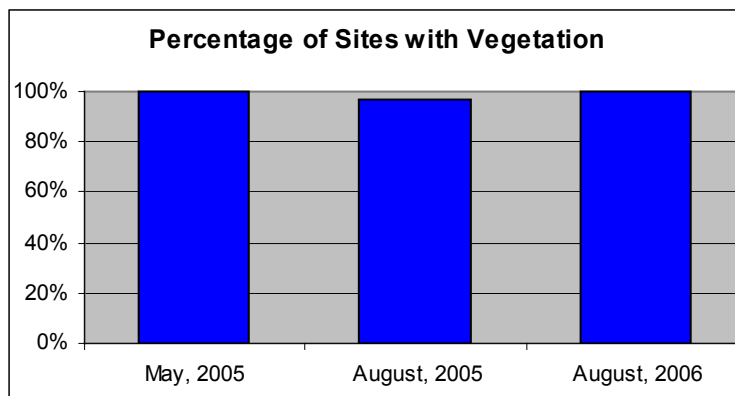


Figure 35. Holem Lake, comparison of the percentage of sites with vegetation in the last three surveys.

3.0 2006 VEGETATION CONTROL

In general, the goal of the vegetation management plan is to control nuisance aquatic species, with a focus on exotic nuisance plants, while preserving and enhancing beneficial native vegetation. Prior to 2006, residents paid a private contractor to treat in front of their lots. These treatments were completed two to three times throughout the season. Contact herbicides were typically used in this treatment. Eurasian watermilfoil was allowed to flourish outside of the treatment areas and the contact treatments only gave short-term control. LARE funds became available last season to treat Eurasian watermilfoil throughout the four lakes. It was decided that a systemic herbicide should be used for the treatment in an effort to give longer-term control. Renovate herbicide was chosen due to its selectivity and effectiveness on milfoil. Treatment areas were laid out during the May sampling. There was actually more milfoil than anticipated, so not all areas of infestation received treatment. The treatment areas are illustrated in Figure 36. Aquatic Control treated a total of 50 acres of Eurasian watermilfoil on June 1, 2006 (25 acres on Millpond, 22 acres on Cook, 2 acres on Kreighbaum, and 1 acre on Holem). Treatment areas were inspected several weeks after treatment and no milfoil was seen. Some small shoreline treatment areas were also completed by another contractor in order to relieve nuisance conditions created by native vegetation, primarily coontail, and filamentous algae.

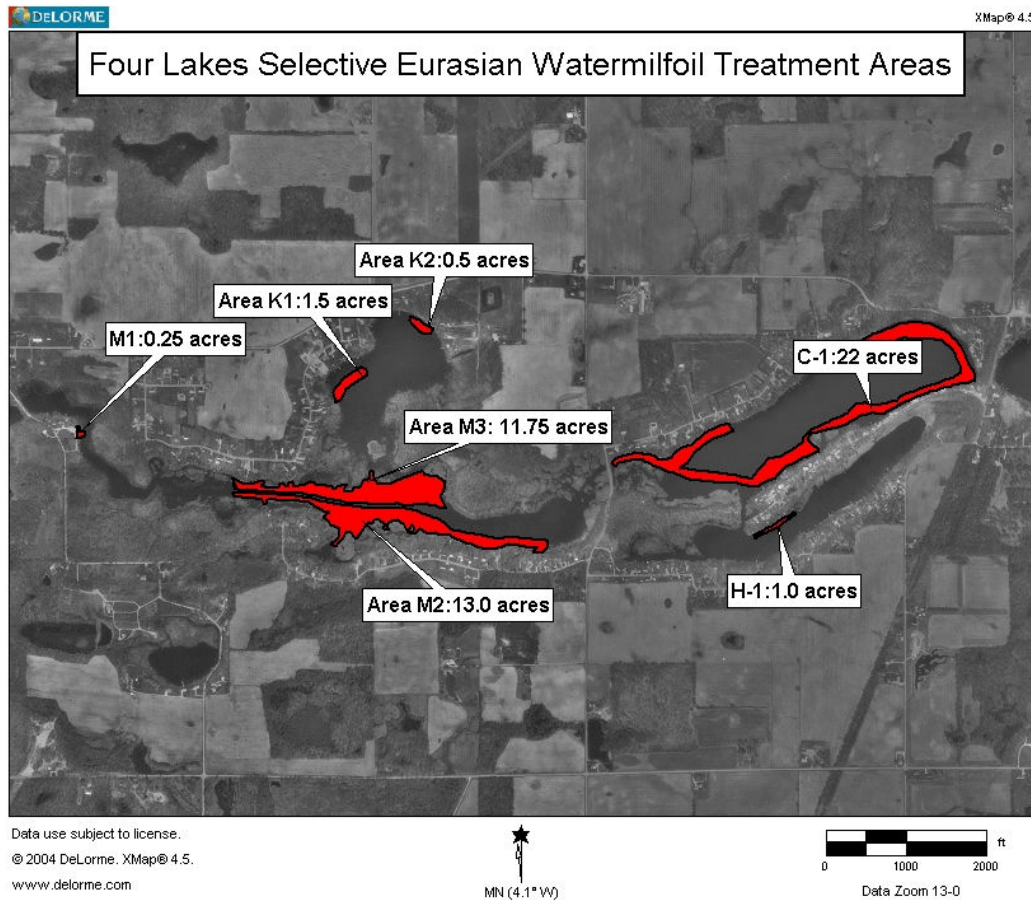


Figure 36. Four Lakes, Eurasian watermilfoil treatment areas, May 31, 2006

In addition, LARE also funded treatment of a small 1-acre patch of common reed located along the south shore of Holem Lake. This treatment was completed on August 15, 2006 (Figure 37). A mixture of Habitat herbicide and Sunwet surfactant was used in the treatment. The plants showed signs of dying by the time the first frost hit northern Indiana. The real test of the effectiveness of this treatment will be seeing how much, if any, common reed returns in 2007.

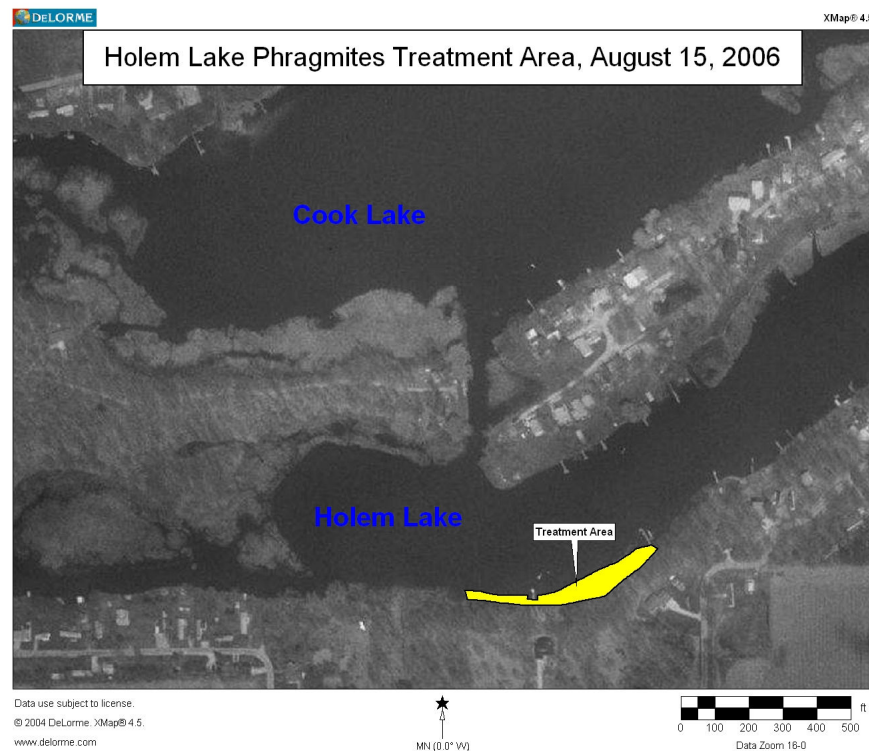


Figure 37. Holem Lake, common reed treatment area, August 15, 2006.

4.0 PUBLIC INVOLVEMENT

A public meeting was held September 26, 2006 at the Plymouth Library. This meeting was designed to gain further input from lake users; to educate lake users of the 2006 vegetation management activities, and to inform users of potential vegetation management plan updates. Approximately nineteen individuals were in attendance and all the individuals filled out a lake user survey form. All survey participants were lake property owners of which 47% lived on Millpond Lake 21% lived on Cook, 21% on Holem, and 11% checked other. Sixty-eight percent of survey participants have lived on the lakes for more than 10 years. Ninety-five percent of those surveyed used the lake for boating, 100% for fishing, 68% used the lake for swimming, and 16% used the lake for irrigation. Concerning problems on the lakes, survey respondents indicated that 89% thought there were too many aquatic plants, 79% believed dredging was needed, 21% thought overuse by non-residents was a problem, and 42% believed poor water quality was a problem. Questions concerning aquatic vegetation indicated that 100% though they had nuisance levels of plants, 100% said plants interfered with their lake use, and 79% believed vegetation affected their property values.

Another topic discussed at the public meeting was the recent discovery of hydrilla (*Hydrilla verticillata*) in Lake Manitou. Hydrilla is an invasive aquatic species that was originally discovered in Florida in the 1960's. There are many characteristics of hydrilla that make it a threat to Indiana waterways. This species can grow in lower light conditions than most native species, grows faster than most native species, and can shade out other species by forming a surface canopy. Hydrilla can be easily confused with

native elodea. The best way to distinguish hydrilla from native elodea is that hydrilla typically has five leaves along each whorl along with visible serrated edges along the leaf margin (Figure 38). What makes controlling the spread of hydrilla difficult is the fact that it can be spread by fragments. **That is why it is vitally important that lake users remove all plants and sediment from their boats when entering and leaving the Four Lakes.** More information about controlling the spread of hydrilla can be found at www.protectyourwaters.net.



Figure 38. Illustration of hydrilla on the left compared to native elodea on the right. Hydrilla typically contains five toothed leaves per whorl while native elodea typically has three leaves per whorl and the teeth are not visible on the leaves (Illustrations provided by Applied Biochemist).

It will be important for the Association to continue to inform users of proper land management practices that have minimal negative impacts on the lakes water quality. This may include discouraging fertilizer use, not disposing of yard waste in or near the lake, and allowing natural vegetation to grow along the shoreline as opposed to concrete seawalls. Residents should also continue to be informed of the benefits of native vegetation on fish populations and water quality. These items can be reinforced in Association newsletters, websites, and at Association meetings.

5.0 ACTION PLAN AND BUDGET UPDATE

The goals of the action plan, laid out in the original plan, are as follows:

1. Maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality, and is resistant to minor habitat disturbances and invasive species.
2. Direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species.
3. Provide reasonable public recreational access while minimizing the negative impacts on plant, fish, and wildlife resources.

It appears that the 2006 season was a step in the right direction for meeting the goals of the action plan. As pointed out in the plant sampling discussion, the diversity and overall health of the native plant community was maintained if not increased, Eurasian watermilfoil was drastically reduced, and reasonable access was provided through limited spot treatments of vegetation in high use areas. Due to the presence of Eurasian watermilfoil in lakes above the Four Lakes and the presence of small amounts in Holem Lake, some milfoil will likely return next season and create nuisance conditions. The hard part is predicting how much will return. In 2005 we underestimated the amount that would be present in 2006. In all likelihood there will be less in 2007 than in 2006. We believe that no more than 47 acres will require treatment next season. It is possible that much less than this will require treatment, but it is better to be on the safe side. We recommend that the FLLA request funding for treatment of 47 acres of Eurasian watermilfoil in 2007 with Renovate herbicide. The cost of this treatment would be around \$20,000.

Phragmites was treated this season with LARE funds. The treated area should be thoroughly inspected next season and any remaining plants should be treated. There was also a small area on the west end of Cook Lake that contained several Phragmites plants. This area should also be treated. These two areas should not total more than 1-acre. The cost of this treatment would be around \$1,000.

In order to adjust the plan and monitor the effects of the treatment it is important to complete plant sampling. This sampling should consist of either a treatment map survey in the spring along with a Tier II survey in the summer. This data should be included in the 2007 update. The cost of the plant sampling and the update would be around \$4500. Table 14 lists a potential 4-year budget of for plant management activities on the Four Lakes.

Table 14. Four-year budget estimate for plant management on the Four Lakes.

	2007	2008	2009	2010
Eurasian watermilfoil treatment:	\$20,000	\$17,500	\$15,000	\$10,000
Phragmites treatment:	\$1,000	\$1,000	-	-
Plant sampling and plan update:	\$4,500	\$4,500	\$4,500	\$4,500
Total potentially funded by LARE:	\$25,500	\$23,000	\$19,500	\$14,500

*budget does not include native treatments since this is handled on an individual basis

In order to provide reasonable access between the lakes dredging may be required. Small channels connect the lakes and these channels are beginning to fill in with sediment and decayed plant material. It is our recommendation that the FLLA pursue funding for a dredging study. A grant application for sediment removal can be found at the following website: <http://www.in.gov/dnr/fishwild/lare/manual.html>.

6.0 APPENDIX UPDATE

6.1 2006 Tier II Sampling Data

Millpond Lake

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYPSP2	POIL	CEDE4	WO?LF	LETR	SPPO	POPE6	POAM	UTMA	LEMN
Mill Pond	8/15/06	41.30092	-86.400478		91	9.0	5			5							
Mill Pond	8/15/06	41.29999	-86.399018		92	6.0	5			5							
Mill Pond	8/15/06	41.29893	-86.398476		93	6.0	5			5		1					
Mill Pond	8/15/06	41.29805	-86.394183		94	4.0	1			1							
Mill Pond	8/15/06	41.29775	-86.391655		95	5.0	5			5						1	
Mill Pond	8/15/06	41.29775	-86.389799		96	6.0	0										
Mill Pond	8/15/06	41.29724	-86.388646		97	3.0	5			5	1		1		1		1
Mill Pond	8/15/06	41.29687	-86.387473		98	4.0	5			5						1	
Mill Pond	8/15/06	41.29589	-86.388217		99	3.0	5			5	1		1				1
Mill Pond	8/15/06	41.29735	-86.386591		100	5.0	1			1							
Mill Pond	8/15/06	41.29686	-86.385583		101	4.0	5			1		1			5	1	
Mill Pond	8/15/06	41.29644	-86.384689		102	3.0	1			1					1		
Mill Pond	8/15/06	41.29728	-86.383986		103	12.0	0										
Mill Pond	8/15/06	41.29674	-86.382813		104	12.0	3			3							
Mill Pond	8/15/06	41.29633	-86.381924		105	6.0	5		3	5							
Mill Pond	8/15/06	41.29634	-86.380667		106	12.0	5			5							
Mill Pond	8/15/06	41.29621	-86.380029		107	3.0	5			5					5		
Mill Pond	8/15/06	41.29648	-86.379488		108	12.0	3			3							
Mill Pond	8/15/06	41.29626	-86.378818		109	8.0	5			5							
Mill Pond	8/15/06	41.29626	-86.378005		110	5.0	3			3							
Mill Pond	8/15/06	41.29665	-86.377664		111	15.0	0										
Mill Pond	8/15/06	41.29651	-86.377233		112	7.0	5			5						1	
Mill Pond	8/15/06	41.2971	-86.376892		113	4.0	5			5	1		1				1
Mill Pond	8/15/06	41.29725	-86.377218		114	6.0	3			3						1	
Mill Pond	8/15/06	41.29782	-86.376924		115	3.0	3			3							
Mill Pond	8/15/06	41.2974	-86.377796		116	10.0	3			3							
Mill Pond	8/15/06	41.29722	-86.378248		117	15.0	0										
Mill Pond	8/15/06	41.29695	-86.378786		118	14.0	0										
Mill Pond	8/15/06	41.29701	-86.379267		119	7.0	5			5							
Mill Pond	8/15/06	41.29696	-86.380256		120	15.0	5			5							
Mill Pond	8/15/06	41.29702	-86.380739		121	6.0	5		1	5						1	
Mill Pond	8/15/06	41.29701	-86.381288		122	3.0	5			5	1		1			3	1
Mill Pond	8/15/06	41.29677	-86.381932		123	13.0	5			5							
Mill Pond	8/15/06	41.29706	-86.382404		124	7.0	5			5							
Mill Pond	8/15/06	41.29722	-86.383316		125	14.0	1			1							
Mill Pond	8/15/06	41.29773	-86.38328		126	5.0	5			5							
Mill Pond	8/15/06	41.29838	-86.382937		127	4.0	5			5							
Mill Pond	8/15/06	41.29838	-86.383692		128	10.0	5			5							
Mill Pond	8/15/06	41.2984	-86.384339		129	4.0	5			5							
Mill Pond	8/15/06	41.29813	-86.384514		130	5.0	5		5	5							
Mill Pond	8/15/06	41.29777	-86.384661		131	6.0	5			5						1	
Mill Pond	8/15/06	41.29765	-86.385339		132	6.0	1			1							
Mill Pond	8/15/06	41.29813	-86.385824		133	4.0	5			5				1		1	
Mill Pond	8/15/06	41.29855	-86.386166		134	4.0	3		1	3							
Mill Pond	8/15/06	41.29804	-86.386578		135	4.0	1			1							
Mill Pond	8/15/06	41.29778	-86.386842		136	4.0	3		3	1						1	
Mill Pond	8/15/06	41.29811	-86.387791		137	4.0	3			3	1		1				1
Mill Pond	8/15/06	41.29851	-86.388433		138	4.0	5			5	1		1				1
Mill Pond	8/15/06	41.29792	-86.390668		139	6.0	5			5							
Mill Pond	8/15/06	41.29812	-86.397583		140	6.0	3			3							

Kreighbaum Lake

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	POIL	CEDE4	CH?AR	NAFL	POPU7	NAGU	POAM	UTMA
Kreighbaum	8/16/06	41.29951	-86.386618		141	2.0	1		1						
Kreighbaum	8/16/06	41.30021	-86.386417		142	4.0	5		5			1			
Kreighbaum	8/16/06	41.30069	-86.386311		143	11.0	5		5						
Kreighbaum	8/16/06	41.30129	-86.385796		144	12.0	1		1						1
Kreighbaum	8/16/06	41.3015	-86.38508		145	7.0	1		1						
Kreighbaum	8/16/06	41.30162	-86.384732		146	20.0	0								
Kreighbaum	8/16/06	41.30155	-86.384269		147	7.0	0								
Kreighbaum	8/16/06	41.3018	-86.383714		148	6.0	3		3						
Kreighbaum	8/16/06	41.30232	-86.383511		149	11.0	1		1						
Kreighbaum	8/16/06	41.30293	-86.383457		150	9.0	3		3						
Kreighbaum	8/16/06	41.30327	-86.383447		151	3.0	5				5			3	
Kreighbaum	8/16/06	41.30351	-86.383842		152	3.0	5	1		5					
Kreighbaum	8/16/06	41.30354	-86.384292		153	20.0	0								
Kreighbaum	8/16/06	41.30388	-86.384694		154	15.0	1		1						
Kreighbaum	8/16/06	41.30387	-86.385401		155	3.0	5				5				
Kreighbaum	8/16/06	41.3038	-86.385876		156	3.0	3				3	1			
Kreighbaum	8/16/06	41.30343	-86.385959		157	12.0	5		5						
Kreighbaum	8/16/06	41.30302	-86.385872		158	6.0	5	5	1						
Kreighbaum	8/16/06	41.30259	-86.386025		159	9.0	5		5						
Kreighbaum	8/16/06	41.30231	-86.386179		160	20.0	0								
Kreighbaum	8/16/06	41.30235	-86.386609		161	3.0	5		5						
Kreighbaum	8/16/06	41.30224	-86.387114		162	2.0	5			1		5	1		
Kreighbaum	8/16/06	41.30201	-86.38639		163	6.0	1	1							
Kreighbaum	8/16/06	41.30177	-86.386913		164	13.0	3		3						
Kreighbaum	8/16/06	41.30152	-86.387283		165	10.0	5		5						
Kreighbaum	8/16/06	41.30148	-86.387742		166	5.0	5	3	5						1
Kreighbaum	8/16/06	41.30123	-86.387651		167	9.0	5		5						
Kreighbaum	8/16/06	41.30076	-86.387475		168	3.0	1	1	1			1			
Kreighbaum	8/16/06	41.30076	-86.387223		169	9.0	5		5						
Kreighbaum	8/16/06	41.30064	-86.386523		170	11.0	5		5						

Holem Lake

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYSP2	POIL	CEDE4	CH?AR	MYSI	UTMA
Holem	8/16/06	41.29573	-86.371119		211	4.0	5	1	3	3			
Holem	8/16/06	41.29583	-86.37034		212	13.0	1			1			
Holem	8/16/06	41.29579	-86.369603		213	10.0	5			5			
Holem	8/16/06	41.29568	-86.368928		214	4.0	5		1	5			1
Holem	8/16/06	41.29582	-86.368466		215	10.0	5			5		1	
Holem	8/16/06	41.29621	-86.367766		216	15.0	5			5			
Holem	8/16/06	41.29654	-86.36712		217	6.0	5			5	5		1
Holem	8/16/06	41.2967	-86.366795		218	7.0	5			5			
Holem	8/16/06	41.29682	-86.366262		219	4.0	5			1	5		
Holem	8/16/06	41.29715	-86.365948		220	13.0	5			5			
Holem	8/16/06	41.2973	-86.365534		221	5.0	5			5	1		
Holem	8/16/06	41.29778	-86.364448		222	15.0	5			5			1
Holem	8/16/06	41.29811	-86.363793		223	6.0	5		3	5	1		
Holem	8/16/06	41.29864	-86.36319		224	12.0	5			5			
Holem	8/16/06	41.29938	-86.36212		225	3.0	5			5	5		
Holem	8/16/06	41.29996	-86.361646		226	6.0	5		3	5			1
Holem	8/16/06	41.30003	-86.362248		227	14.0	5			5			
Holem	8/16/06	41.29967	-86.363047		228	12.0	5			5			
Holem	8/16/06	41.29936	-86.363707		229	7.0	5			5	5		
Holem	8/16/06	41.29897	-86.364264		230	14.0	5			5			
Holem	8/16/06	41.29871	-86.364741		231	5.0	5		3	3			
Holem	8/16/06	41.29831	-86.365562		232	10.0	5			5			1
Holem	8/16/06	41.29755	-86.366534		233	7.0	5	1	5	5			
Holem	8/16/06	41.29702	-86.367444		234	3.0	5		5	1			
Holem	8/16/06	41.29646	-86.368573		235	12.0	5			5			
Holem	8/16/06	41.29638	-86.369745		236	13.0	5			5			
Holem	8/16/06	41.29668	-86.37119		237	9.0	5			5			1
Holem	8/16/06	41.29573	-86.371879		238	3.0	3		1	3			
Holem	8/16/06	41.29574	-86.373163		239	3.0	3			3			
Holem	8/16/06	41.29571	-86.37445		240	2.0	1			1			

Cook Lake

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	LETR	CEDE4	CH?AR	WOCO	VAAM3	NAGU	POAM	LEMN
Cook Lake	8/16/06	41.29891	-86.375291		171	3.0	1		1						
Cook Lake	8/16/06	41.29881	-86.372786		172	3.0	1	1	1						
Cook Lake	8/16/06	41.29865	-86.37235		173	8.0	0								
Cook Lake	8/16/06	41.29819	-86.371414		174	14.0	5		5						
Cook Lake	8/16/06	41.29825	-86.370292		175	4.0	5		5						
Cook Lake	8/16/06	41.29841	-86.369521		176	6.0	5		5						
Cook Lake	8/16/06	41.29856	-86.368726		177	13.0	1		1						
Cook Lake	8/16/06	41.29883	-86.367718		178	3.0	1		1				1		
Cook Lake	8/16/06	41.29959	-86.367612		179	9.0	5		5						
Cook Lake	8/16/06	41.30012	-86.36681		180	13.0	5		5						
Cook Lake	8/16/06	41.30028	-86.365691		181	12.0	0								
Cook Lake	8/16/06	41.30026	-86.364924		182	4.0	1		1						
Cook Lake	8/16/06	41.30069	-86.364359		183	6.0	5		5						
Cook Lake	8/16/06	41.30042	-86.363656		184	2.0	0								
Cook Lake	8/16/06	41.301	-86.362657		185	8.0	5		5						
Cook Lake	8/16/06	41.30117	-86.362048		186	4.0	1		1					1	
Cook Lake	8/16/06	41.30155	-86.361356		187	11.0	5		5						
Cook Lake	8/16/06	41.30159	-86.360602		188	4.0	5			5					
Cook Lake	8/16/06	41.30184	-86.360094		189	8.0	5		5						
Cook Lake	8/16/06	41.30235	-86.35956		190	5.0	5		5						
Cook Lake	8/16/06	41.30283	-86.359925		191	6.0	3		3						
Cook Lake	8/16/06	41.30327	-86.360908		192	7.0	5		5						
Cook Lake	8/16/06	41.30319	-86.361893		193	8.0	3		3						
Cook Lake	8/16/06	41.3032	-86.363193		194	6.0	5		5						
Cook Lake	8/16/06	41.30303	-86.363835		195	11.0	5		5						
Cook Lake	8/16/06	41.30254	-86.364591		196	4.0	5		5						
Cook Lake	8/16/06	41.30235	-86.365164		197	15.0	1		1						
Cook Lake	8/16/06	41.30224	-86.365642		198	4.0	5		1					5	
Cook Lake	8/16/06	41.30192	-86.366168		199	3.0	5		1				1	5	
Cook Lake	8/16/06	41.3016	-86.366519		200	8.0	3		3						
Cook Lake	8/16/06	41.30144	-86.366955		201	4.0	0								
Cook Lake	8/16/06	41.30125	-86.367212		202	12.0	0								
Cook Lake	8/16/06	41.30106	-86.367693		203	3.0	1					1		1	
Cook Lake	8/16/06	41.30063	-86.368176		204	11.0	3		3						
Cook Lake	8/16/06	41.3004	-86.368829		205	6.0	5							5	
Cook Lake	8/16/06	41.30014	-86.369284		206	13.0	0								
Cook Lake	8/16/06	41.30013	-86.369936		207	4.0	1			1					
Cook Lake	8/16/06	41.29977	-86.370668		208	8.0	5		5						
Cook Lake	8/16/06	41.29964	-86.371341		209	4.0	5		5		1			3	1
Cook Lake	8/16/06	41.29899	-86.372209		210	4.0	3		1					3	

6.2 2007 Vegetation Control Permits

Millpond Lake



APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake ☒ Multiple Treatment Areas

Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY

License No.

Date Issued

Lake County

Return to: Page 1 of
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: \$5.00

Applicant's Name		Lake Assoc. Name Four Lakes Lake Association	
Rural Route or Street 17064 Millpond Trail		Phone Number 574-936-8545	
City and State Plymouth, IN		ZIP Code 47274	
Certified Applicator (if applicable)	Company or Inc. Name		Certification Number
Rural Route or Street		Phone Number	
City and State		ZIP Code	
Lake (One application per lake) Millpond Lake		Nearest Town Plymouth	County Marshall
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.			
Treatment Area # 1	LAT/LONG or UTM's		
Total acres to be controlled 15-20	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s) Late May/early June		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate herbicide will be used to control Eurasian watermilfoil. Actual areas determined following May survey			
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Data taken from 2006 spring T1 survey			
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
Coontail		30	
Common Bladderwort		10	
Eurasian watermilfoil	X	30	
flatstem pondweed		5	
spatterdock		5	
Largeleaf pondweed		5	
white water lily		5	
duckweed		5	
curlyleaf pondweed		5	

Treatment Area #	LAT/LONG or UTM's	
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	
Treatment method: <input type="checkbox"/> Chemical <input checked="" type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.		
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____		
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
<i>INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.</i>		
Applicant Signature		Date
Certified Applicant's Signature		Date

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of \$5.00 to:

DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF FISH AND WILDLIFE
 COMMERCIAL LICENSE CLERK
 402 WEST WASHINGTON STREET ROOM W273
 INDIANAPOLIS, IN 46204

Kreighbaum lake-Vegetation Control Permit Application



**APPLICATION FOR AQUATIC
VEGETATION CONTROL PERMIT**

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake ☒ Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

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Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: \$5.00

Applicant's Name		Lake Assoc. Name Four Lakes Lake Association
Rural Route or Street 17064 Millpond Trail		Phone Number 574-936-8545
City and State Plymouth, IN		ZIP Code 46563
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake) Kreighbaum Lake	Nearest Town Plymouth	County Marshall
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's Areas to be determined following May survey	
Total acres to be controlled 2-5 acres	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft) 15	Expected date(s) of treatment(s) Late May early June	
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate herbicide will be used to control Eurasian watermilfoil. Actual areas determined following May survey		
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Data From 2006 Spring TI survey		

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Coontail		25
Eurasian watermilfoil	x	25
Northern watermilfoil		5
Largeleaf pondweed		5
Sago pondweed		5
Curlyleaf pondweed		5
Chara		5
Illinois pondweed		5
white water lily		5
Spatterdock		5
Duckweed		5
Small pondweed		5

Treatment Area #	LAT/LONG or UTM's	See map
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	
Treatment method:	<input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical	
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.		
Plant survey method:	<input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____	
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.		
Applicant Signature		Date
Certified Applicant's Signature		Date

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of \$5.00 to:

DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF FISH AND WILDLIFE
 COMMERCIAL LICENSE CLERK
 402 WEST WASHINGTON STREET ROOM W273
 INDIANAPOLIS, IN 46204

Cook Lake-Vegetation Control Permit Application



APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake ☒ Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

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Lake County

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Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: \$5.00

Applicant's Name		Lake Assoc. Name Four Lakes Lake Association
Rural Route or Street 17064 Millpond Trail		Phone Number 574-936-8545
City and State Plymouth, IN		ZIP Code 46563
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake) Cook Lake	Nearest Town Plymouth	County Marshall
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's See Map	
Total acres to be controlled 20-30	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft) 15	Expected date(s) of treatment(s) Late May	
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate herbicide will be used to control Eurasian watermilfoil. Actual areas determined following May survey		
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Data collected during May 2006 TI survey		

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Coontail		20
Eurasian watermilfoil	x	40
Largeleaf pondweed		10
Curlyleaf pondweed		20
Chara		5
Water lily		3
Spaterdock		2

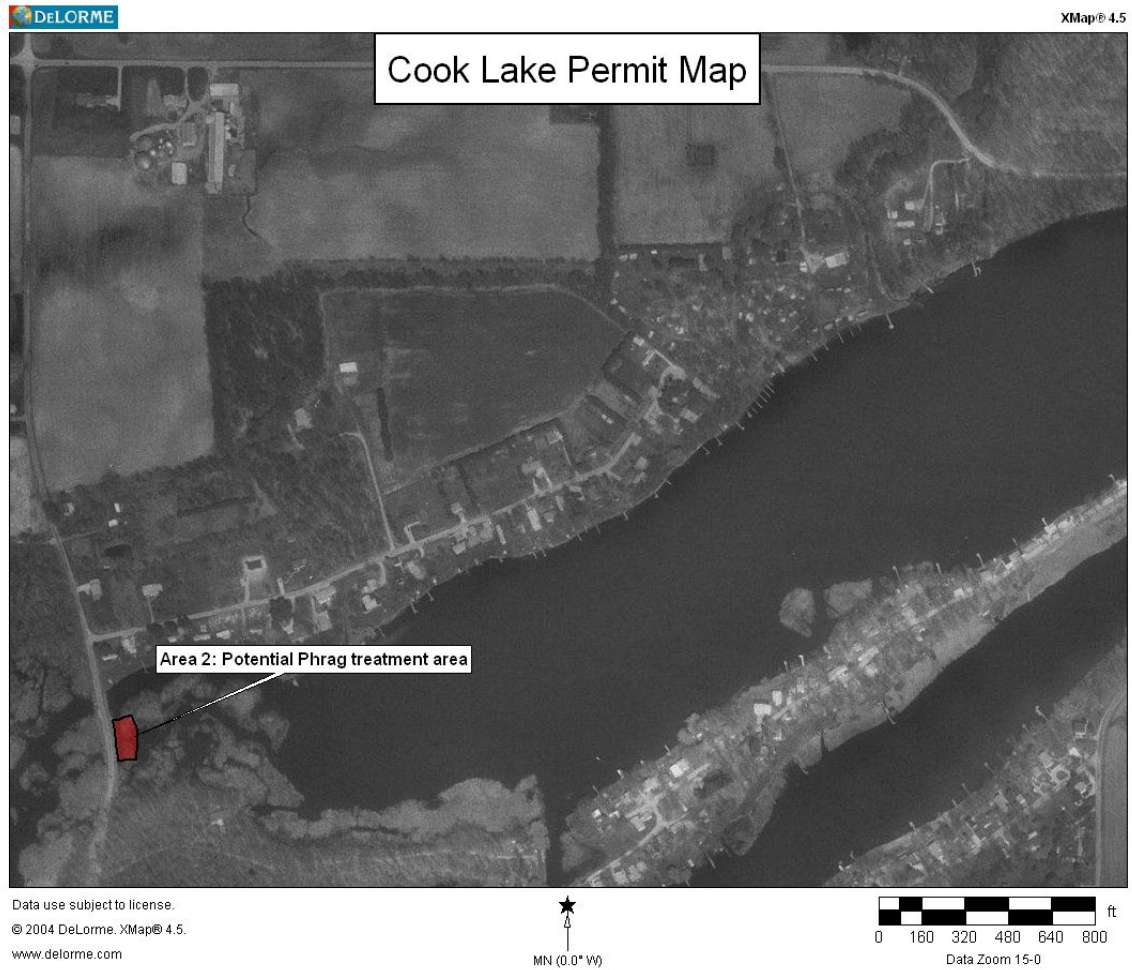
Treatment Area #	2	LAT/LONG or UTM's	center of bed @ N41.298219 W86.374511
Total acres to be controlled	0.2	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	1	Expected date(s) of treatment(s)	mid July
Treatment method:	<input checked="" type="checkbox"/> Chemical	<input type="checkbox"/> Physical	<input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.			
Glyphosate/Habitat mix for control of Phrag			
Plant survey method:	<input type="checkbox"/> Rake	<input type="checkbox"/> Visual	<input type="checkbox"/> Other (specify)
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
Phragmites australis	x	10	
Purple loosestrife	x	30	
Common cattail		40	
Swamp loosestrife		10	
Smartweed		10	
INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.			
Applicant Signature			Date
Certified Applicant's Signature			Date

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist

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Cook Lake-Vegetation Control Permit Map (Page 3)



Holem Lake Permit



APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake ☒ Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

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Lake County

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Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: \$5.00

Applicant's Name		Lake Assoc. Name Four Lakes Lake Association
Rural Route or Street 17064 Millpond trail		Phone Number 574-936-8545
City and State Plymouth, IN		ZIP Code 46563
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake) Holem Lake	Nearest Town Plymouth	County Marshall
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's See Map	
Total acres to be controlled 5 to 7	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft) 15	Expected date(s) of treatment(s) Late May	
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate herbicide will be used to control Eurasian watermilfoil. Actual areas determined following May survey		
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Data collected during 2006 spring TI survey		

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Coontail		35
Bladderwort		5
Eurasian watermilfoil	x	20
Chara		10
Elodea		2
Flatstem pondweed		3
water lily		5
Spatterdock		5
Largeleaf pondweed		5
Illinois pondweed		5
Variable pondweed		5

Treatment Area #	2	LAT/LONG or UTM's	Center of bed @ N41.295644 W86.368299
Total acres to be controlled	0.3	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	1	Expected date(s) of treatment(s)	mid July
Treatment method:	<input checked="" type="checkbox"/> Chemical	<input type="checkbox"/> Physical	<input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.			
Glyphosate/Habitat combination for control of phragmites			
Plant survey method:	<input type="checkbox"/> Rake	<input type="checkbox"/> Visual	<input type="checkbox"/> Other (specify)
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
Phragmites australis	x	20	
Purple loosestrife	x	30	
Common cattail		50	
INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.			
Applicant Signature			Date
Certified Applicant's Signature			Date

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist

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 DIVISION OF FISH AND WILDLIFE
 COMMERCIAL LICENSE CLERK
 402 WEST WASHINGTON STREET ROOM W273
 INDIANAPOLIS, IN 46204

Holem Lake Permit Map

